United States Department of the Interior
U.S. Fish and Wildlife Service
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AESO/SE

2-21-95-F-441	2-21-01-F-211
2-21-95-F-442	2-21-01-F-300
2-21-95-F-443	2-21-01-F-302
2-21-95-F-446	2-21-01-F-303
2-21-95-F-447	2-21-01-F-306
2-21-01-F-105	2-21-01-F-307

Mr. John C. Bedell
Forest Supervisor
Apache-Sitgreaves National Forest
P.O. Box 640
Springerville, Arizona 85938-0640

RE: Blue and San Francisco Rivers Consultation

Dear Mr. Bedell:

This biological opinion (BO) responds to your request for consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated May 14, 2001, and received by us on May 15, 2001. At issue are impacts that may result from the proposed authorization or re-authorization of livestock grazing on multiple allotments along the Blue and San Francisco rivers within the Apache National Forest, located in Apache and Greenlee counties, Arizona, and their effects to spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), critical habitat for spikedace and loach minnow, Mexican spotted owl (*Strix occidentalis lucida*), and Chiricahua leopard frog (*Rana chiricahuensis*).

Additionally, you requested our concurrence that the proposed action is not likely to adversely affect razorback sucker (*Xyrauchen texanus*), southwestern willow flycatcher (*Empidonax traillii*

extimus), bald eagle (*Haliaeetus leucocephalus*), jaguar (*Panthera onca*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), and Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*). The FWS concurs that the proposed action is not likely to adversely affect these species. Details for these concurrences are provided in Appendix A.

This biological opinion is based on information provided in multiple biological assessments (BA), addenda to those BAs, draft and final environmental assessments, project proposals, Decision Notices (DNs), Term Permits and modifications, allotment maps, and other supporting documents; telephone conversations with Forest Service staff, field investigations, and other sources of information. Specific sources of information will be listed under each allotment in the project description below. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, livestock grazing and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

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Consultation History

This consultation will review the effects of the proposed action on multiple allotments. Your May 14, 2001, letter requested varying types of consultation depending on the allotment and species involved, as follows:

Table 1. Proposed actions consulted on in this Biological Opinion.

Allotments	Species/Critical Habitat	Action
Upper Campbell Blue, Turkey Creek, Bobcat-Johnson, Fishhook, Steeple Mesa, KP, and Raspberry	spikedace, critical habitat for spikedace and loach minnow	Reinitiation of formal consultation on 1995 decisions
Alpine, Beaver Creek, Coyote-Whitmer, Fish Creek, Hannagan, Sprucedale-Reno, Grandfather, and Colter Creek	Chiricahua leopard frog	Conference report
Baseline/Horsesprings	Spikedace, loach minnow, critical habitat for spikedace, and yellow-billed cuckoo	Reinitiation of formal consultation for a 1998 AMP
Baseline/Horsesprings	Chiricahua leopard frog	Conference report for 1998 AMP
PS, Red Hill, Cow Flat, Dark Canyon, Stone Creek, and Foote Creek	Spikedace, critical habitat for spikedace and loach minnow, yellow-billed cuckoo	Reinitiation of formal consultation for 1999 AMP decisions
Bush Creek, Alpine, East Eagle, Tule	Spikedace, critical habitat for spikedace and loach minnow, and yellow-billed cuckoo	Reinitiation of formal consultation for ongoing grazing for three more years
Bush Creek, East Eagle, Tule	Chiricahua leopard frog	Conference report for three more years of ongoing grazing
Hayground Allotment	Spikedace and critical habitat for spikedace and loach minnow	Reinitiation of formal consultation for 1993 AMP revision
Hayground Allotment	Chiricahua leopard frog	Conference report for 1993 AMP revision

Udall Allotment	All species	Initiation of formal consultation

The FWS provided a letter to the Forest Service on May 30, 2001, indicating that consultation was being initiated on the 28 allotments addressed in the May 14, 2001, letter. In a July 12, 2001, letter, we notified the Forest Service that, due to the amount of time required to conduct individual consultations on 28 allotments, we were recommending that a separate conference opinion be completed for those allotments for which the only species of concern was Chiricahua leopard frog. This included the Beaver Creek, Fish Creek, Grandfather, Hannagan, Sprucedale-Reno, Alpine, Colter Creek, and Coyote-Whitmer allotments. The conference report was completed on January 10, 2002.

The FWS had additionally received requests for individual consultations on the Pigeon and Wildbunch allotments and for the Hickey, Sardine, Mud Springs, and Double Circles allotments. The FWS had responded with a May 10, 2001, letter for the Pigeon and Wildbunch allotments, indicating that consultation had been initiated. We sent a May 30, 2001, letter indicating that consultation had been initiated for the Double Circles, Hickey, Sardine, and Mud Springs allotments.

Due to the large number of consultation requests for grazing actions on the Apache-Sitgreaves National Forests (A-S), the FWS recommended that the allotments be batched by watershed. The Eagle Creek Watershed consultation was to include the Baseline/Horsesprings, Dark Canyon, Double Circle, East Eagle, Mud Springs, and Tule allotments. The Black River Watershed was to include the Burro Creek, Hayground, PS, Reservation, and Udall allotments. This consultation was completed on November 29, 2001. The Blue/San Francisco watersheds consultation was to include the Bobcat-Johnson, Bush Creek, Cow Flat, Fishhook, Steeple Mesa, Foote Creek, Hickey, KP, Pigeon, Raspberry, Red Hill, Sardine, Stone Creek, Turkey Creek, Upper Campbell Blue, and Wildbunch allotments. The Forest Service accepted this proposal in a July 23, 2001 letter. This consultation will involve only those allotments in the Blue/San Francisco watersheds.

A 60-day extension was requested on July 12, 2001, resulting in a new completion date of November 26, 2001. Due to the large number of requests for spikedace and loach minnow consultations from the Forest Service, we requested a second 60-day extension on November 8, 2001 which was granted by the Forest Service, resulting in a new final due date January 27, 2002. The Forest Service responded on November 27, 2001, indicating that an Applicant to the consultation had denied the FWS's request for an extension for the Blue/San Francisco watersheds consultation. The FWS responded with a letter dated December 5, 2001, indicating that we were unable to meet the original timeline and would continue to work on the biological opinion for the Blue/San Francisco watersheds.

On August 14, 2002, we met with personnel from the Forest Service to discuss additional information the Forest Service wished to be considered in the development of the biological opinion. This new information was substantial, including term permit modifications that adjusted livestock numbers and seasons of use, and identified conservation measures for spikedace and loach minnow; updated

Biological Assessments and Evaluations (BAEs), and other information. As a result of this information, which was received in its entirety on September 3, 2002, the FWS needed to re-write the existing draft biological opinion. The AESO and the Forest Service agreed to a new deadline of November 2, 2002. On August 19, 2002, we sent a letter to the Forest Service suggesting reinitation; however, the Forest Service declined to reinitiate. The FWS published a final rule designating the Chiricahua leopard frog as a threatened species in the Federal Register on June 30, 2002, effective July 15, 2002. As a result, the FWS will include Chiricahua leopard frog within this biological opinion, rather than in an adjoining conference report.

A draft biological opinion was provided to the Forest Service on November 8, 2002. Comments were received from the Forest Service on January 24, 2003, at a meeting held to discuss those comments and suggested revisions to the biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

As noted in the consultation history, the original request for consultation involved 28 allotments. This consultation includes 16 of those allotments. The proposed action would authorize cattle grazing on 16 allotments for varying amounts of time, seasons, and numbers of cattle. All of the allotments are located on the Apache National Forest, within the Alpine and Clifton Ranger Districts. The allotments are reviewed individually below.

According to the FWS's section 7 Handbook, the proposed action area should include the area influenced by all direct and indirect effects. For this consultation, the proposed action will include the area encompassed by the northern boundary of the Stone Creek Allotment downstream on the Blue River to 25 miles past the southern boundary of the Hickey Allotment (Figure 1, Appendix B). This includes approximately 15 miles of the Blue River that flow through the Sandrock Allotment, which is not currently under consultation, but which is located between the Raspberry and Pigeon and Wildbunch allotments, which are under consultation. An additional three miles of the San Francisco River below the Hickey allotment are also included within the consultation. This approach is consistent with the use of 25 miles by the Forest Service in their BAEs. The Forest Service has routinely considered the effects of the action 25 miles downstream of the proposed action site when evaluating effects on spikedace and loach minnow.

It should be noted that year-to-year implementation of the proposed action, as described below, may have been affected by drought conditions on some allotments. In these instances, cattle may have entered the allotments later than originally planned, or may have been removed earlier than was originally scheduled. In these instances, the allotments may have received more rest than was initially planned for some years. However, the option to use the allotments to the full extent, as described for

each allotment below, is the action under consideration, and the action covered by this biological opinion. We have indicated where an allotment may have received more rest, as it contributes to the overall condition of the allotment. Because the action may be implemented in full in subsequent years, it is necessary to analyze the action as described below for purposes of this consultation.

Stone Creek Allotment

We based our analysis for the Stone Creek Allotment on an October 6, 1998, AMP, a March 1, 1999, EA, Parts 1 and 2 of a Term Grazing Permit dated June 28, 2000, Parts 1 and 2 of Term Grazing Permits dated June 28, 2000 and July 14, 2000, rangeland management monitoring/compliance documentation for 2000, 2001, and 2002. Figure 2 in Appendix B contains a map of the Stone Creek Allotment. The Forest Service manages the Stone Creek Allotment jointly with the Cow Flat, Foote Creek, and PS allotments. One Permittee uses all of these allotments. (The Black River opinion, numbers 2-21-90-F-120R, 2-21-01-F-305, and 2-21-01-F-313, addresses the PS Allotment). A second Permittee additionally uses the Stone Creek Allotment. The Cow Flat and the Foote Creek Winter Pasture are jointly used as "winter country" while the PS, Stone Creek, and remainder of Foote Creek are considered "summer country" (which includes fall use). The Forest Service currently permits the first Permittee for 110 cow/calf for the Foote Creek, PS, Stone Creek, and Cow Flat allotment. A second permittee is authorized for 16 cow/calf on the Stone Creek Allotment. Livestock graze the Stone Creek Allotment and portions of the Foote Creek summer allotment one year, with livestock grazing the PS Allotment and remaining portions of Foote Creek summer allotment the following year. This equates to rest every other year from livestock grazing.

The October 6, 1998, BAE notes that 132 cow/calf pairs were permitted on Stone Creek for the first Permittee, and 42 cow/calf pairs for the second Permittee. However, in the March 1, 1999, DN, the Forest Service noted that they had selected Alternative 6. This alternative required the phased in reduction of cattle herds by 1/3 each year for three years, beginning in May of 2000 for the second permittee. The first permittee was also given a temporary permit that could allow for an additional 51 cow/calf units for 2000 through 2002; however, no validation documentation for these additional cow/calf units was issued during these years (USFS 2003).

The consultation request for the Stone Creek Allotment is for reinitiation of formal consultation for spikedace, and loach minnow critical habitat for 1999 decisions to develop AMPs. Additionally, the FWS has notified the Forest Service that we will be including consultation for spikedace and loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres

- 8,898
- 3,083 full capacity range acres
- 5,654 potential capacity range acres

- 161 no capacity range acres

Period of Proposed Action
- Remaining time on two 10-year permits issued on June 28, 2000, and July 14, 2000, to two individual permittees.

Use of Pastures
- Three pastures used (East Stone Pasture, West Stone Pasture, Bob Thomas Riparian Pasture). PS East Pasture would be used first or last. Bob Thomas Riparian Pasture and Little Creek Pasture have little capacity, and would only be used for four days per year as transition pastures between stone pastures and Terry Flat Pasture.
- Two traps (Terry Flat Lake, Woods Trap)
- Two pasture removed from grazing

Type of Grazing System

- Deferred Rest. Stone Creek and PS East Pasture grazed in alteration with remaining PS Allotment pastures and Foote Creek summer pastures, as follows:

Grazing Period	EVEN YEARS Beginning 2000	ODD YEARS Beginning 2001
SUMMER/FALL	Foote Creek Summer/PS West	Stone Creek/PS East
WINTER/SPRING*	Foote Creek Winter/Cow Canyon and all other pastures	Lanphier

* As winter/spring period spans two years, the year that pastures are entered will be used for scheduling this period.

Number of Cattle
- 126 cow/calf pairs (Joint herd of two Permittees grazing these allotments together).

Season of Use
- May 16 - October 15 (for the Stone Creek Allotment itself; part of year-round grazing operation that includes other Allotments)

Percent Utilization
- Summer/fall utilization would be 45 percent on range in good condition, 40 percent on range in fair condition, 30 percent on range in poor condition, and 20 percent on range in very poor condition.

Conservation/Mitigation Measures

- Cowbird trapping takes place at the Alpine Southwestern Willow Flycatcher site in the years when Lower Little and Woods Trap pastures are grazed before 8/1.
- There will be no livestock grazing of rested pastures in the year of scheduled rest.
- Riparian or short-term use pasture grazing will be implemented for Bob Thomas Riparian pasture on the Stone Creek allotment.

Monitoring

- The March 1999 DN notes that grazing utilization monitoring will be conducted a minimum of two times for each pasture scheduled for livestock use: once prior to livestock entry, and once at or about the mid-point of scheduled pasture use period (earlier or later, if indicated). Utilization at that point in time, on key species in key areas, will be measured.

Upper Campbell Blue Allotment

The analysis for the Upper Campbell Blue Allotment is based on a May 15, 2001, Addendum to the October 5, 1995, BAE, a May 14, 2001 Addendum to the October 5, 1995, BAE, a 1999 Utilization Survey/Condition and Trend/Range Analysis report, a permit modification, dated June 27, 1997, a second permit modification dated November 6, 2001, an October 5, 1995, BAE, rangeland management monitoring/compliance records from 2000 - 2002, and a December 5, 1995 DN and Final EA. Figure 3 in Appendix B contains a map of the Upper Campbell Blue Allotment.

The consultation request on the Upper Campbell Blue Allotment is for reinitiation of consultation for spikedace and loach minnow critical habitat. We notified the Forest Service that we will be including consultation for spikedace and loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 19,162
  - 1,958 full capacity range acres
  - 7,688 potential capacity range acres
  - 9,515 no capacity range acres

Period of Proposed Action
- Remaining time on a 10-year permit issued in 1996

Number of Pastures
- Five main pastures - West, Turkey, Cienega, Campbell, and Castle
- Five holding pastures/traps - Holding 1, Holding 2, Holding 3, North, and South

Type of Grazing System
- Deferred Rotation

Number of Cattle
- 190 cow/calf (Reflects reduction of cattle per 1995 decision) or 688 AUMs (Actual use for 1999 was 200 cow/calf, per the Upper Campbell Blue 1999 Utilization Survey)

Season of Use
- 7/15 - October 31 (7/15 - 9/30 = summer growing season; 10/1 - 10/31 = early dormant season)

Percent Utilization
- 0 - 45 percent on forage and browse in riparian areas
- 0 - 40 percent on forage and browse in upland areas

Conservation/Mitigation Measures
- Reduced utilization level in areas supporting Mexican spotted owls (*Strix occidentalis lucida*);
- Monitoring use and removal of cattle before forage and browse utilization exceed 45 percent to protect occupied loach minnow habitat;
- Exclusion of cattle from a small portion of the Campbell Pasture adjacent to Coleman Creek to protect Apache trout (*Onchorhynchus apache*);
- Exclusion of grazing from 0.75 miles of the lower reach of Turkey Creek upstream of its confluence with Coleman Creek;
- No mineral supplement sites or herd-size gathering or trailing done within any PACs for Mexican spotted owls.

Turkey Creek Allotment

Analysis of those portions of the proposed action occurring on the Turkey Creek Allotment are based on an October 11, 1995, BAE, a 2001 Addendum to the BAE, and December 13, 1995, Final Environmental Assessment, DN and Finding of No Significant Impact (FONSI). The proposed action is to authorize grazing via a continuing 10-year permit on the Coyote-Whitmer and Turkey Creek allotments. (The Coyote-Whitmer Allotment required analysis only for effects to Chiricahua leopard frog). Figure 4 in Appendix B contains a map of the Turkey Creek Allotment.

A June 26, 1997, letter to the Permittee from the Acting District Ranger indicates that required measures for protection of loach minnow include fencing 2.25 miles along Campbell Blue River to eliminate livestock grazing south of the river within the Turkey Creek Allotment. This work was completed in 1999.

The consultation request for the Turkey Creek Allotment is for reinitiation of formal consultation for spikedace and loach minnow critical habitat. We also included consultation for spikedace and loach

minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 10,600 acres (managed under one permit with the Coyote-Whitmer Allotment).

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 1996.

Number of Pastures
- Four main pastures - Turkey Creek A, Fall, Milligan, and Heifer
- Three holding pastures - Fall Creek, Cameron, and State Line
- Two "No Grazing" pastures

(The Fall and Milligan pastures were excluded from use by construction of fencing, as required in Alternative C of the 1995 EA to protect spikedace and loach minnow habitat).

Type of Grazing System
- Deferred Rotation; Used in rotation with the Coyote-Whitmer Allotment. The Turkey Creek Allotment is treated as one of eight pastures. The Coyote-Whitmer Allotment has been authorized for 651 AUMs.

Number of Cattle
- 70 cow/calf

Season of Use
- Portions of the summer growing season between July 15 - September 30, and the early dormant season of October 1 - 31, in rotation with other pastures.

Percent Utilization
- 0 - 45 percent utilization of forage and browse in riparian areas
- 0 - 40 percent utilization of forage and browse in upland areas

Conservation/Mitigation Measures
- Construction of fencing along 2.25 miles of the Campbell Blue Creek to exclude cattle grazing within the creek to benefit spikedace and loach minnow;
- Closure of two water gaps south of Forest Road 59F on the fence adjacent to Coleman Creek to benefit Apache Trout.

Bobcat-Johnson Allotment

We based our analysis for the Bobcat-Johnson Allotment on a May 15, 2001, addendum to the BAE, a May 5, 2001, addendum to the BAE, Parts 1 and 2 of a January 2001 Term Grazing Permit, an August 30, 2001 Term Permit modification (#1), a December 5, 1995, final EA and DN, a September 29, 1995, BAE, and numerous allotment maps.

Figure 5 in Appendix B is a map of the Bobcat-Johnson Allotment and the various pastures within the allotment. The proposed action would include measures to attempt to minimize adverse effects to loach minnow from grazing in the riparian corridor. Parts 1 and 2 of the Term Permit signed with the Permittees in 2001 indicates that stream bottom pastures 3, 4, and 5, and the Maness Pasture will be excluded from grazing to eliminate livestock use of the Blue River corridor within the Bobcat-Johnson Allotment. The Term Permit further notes that fencing will be constructed to exclude livestock from the Blue River corridor in the Lower Bobcat Pasture if monitoring shows cattle are accessing the river. Additionally, the 2001 Term Permit notes that the Muddy Pasture, formerly of the Bobcat-Johnson Allotment, has been removed from the allotment. The BAE Addendum for Chiricahua leopard frog notes that the AMP in place is not supported by the necessary NEPA analysis, and is dated 1975.

The consultation request for the Bobcat-Johnson Allotment is for reinitiation of formal consultation on spikedace and loach minnow critical habitat. As before, we included consultation for spikedace and loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 25,300 acres
  - 6,646 full capacity (FC) range acres
  - 780 potential capacity (PC) range acres
  - 17,853 no capacity (NC) range acres

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 2001.

Number of Pastures
- Five main pastures - Castle, Upper Bobcat, Lower Bobcat, Nolan, and Johnson.
- Five holding pastures - YJ Heifer 1, YU Heiffer 2, YJ Heiffer 3, School, and Trap.
- Four pastures removed from grazing - Maness, Stream bottom 3, 4, and 5.
- One pasture (Muddy) removed from the Allotment.

Type of Grazing System

- Deferred rotation, using eight pastures each year. These pastures include Upper Bobcat, Lower Bobcat, Nolan, Johnson, YJ Heifer pastures 12, 2, and 3, and the Castle Pasture will be grazed annually from June through June 14.

Number of Cattle
- 42 cattle in 1995 - 2000 (or 319 AUMs)
- 32 cattle beginning in 2001

Season of Use
- November 1 - June 14 (11/1 - 3/31 = dormant season; 4/1 - 6/14 = spring growing season)

Percent Utilization
- 45 percent utilization by weight on forage and browse in riparian areas
- 40 percent utilization by weight on forage and browse in upland areas

Conservation/Mitigation Measures
- Livestock excluded from the Blue River riparian corridor.

Foote Creek Allotment

The analysis for Foote Creek is based on a September 22, 1998 AMP, a March 1, 1999, EA, and Parts 1 and 2 of a Term Grazing Permit dated June 2000. The proposed action involves 24,742 acres on the summer and winter portions of Foote Creek, which is located within Greenlee County. Figure 6 in Appendix B is a map of the Foote Creek Allotment and pastures. The Foote Creek Allotment is jointly managed with the Cow Flat Allotment. Specifically, the Foote Creek Winter Pasture and the Cow Flat Allotment are considered "winter country", and are analyzed under Cow Flat in this opinion, while the remainder of the Allotment is used for fall grazing.

Several allotments are being managed jointly under two Permittees. The Stone Creek Allotment, along with the PS East Pasture would provide summer/fall grazing one year, while the remainder of PS and Foote Creek summer pastures provide summer/fall grazing the alternate year. Lanphier Pasture would provide winter/spring grazing one year while all the other remaining pastures on the Cow Flat Allotment and Foote Creek Winter Pasture would provide winter/spring grazing in the alternate year.

On the Foote Creek Allotment, the West Thomas Pasture is not grazed until after 8/31 to allow for riparian habitat recovery for Mexican spotted owls. This may be beneficial to loach minnow and spikedace and loach minnow critical habitat as well. An additional 40 acres of the West Thomas Pasture of Foote Creek are not used because they are included as part of a research natural area.

The consultation request for Foote Creek is for reinitiation of formal consultation for spikedace, and loach minnow and spikedace critical habitat for 1999 decisions to develop AMPs. We included consultation for loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 24,742

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 2000.

Number of Pastures
- Ten main pastures - Hannagan, Willow, Cole, Taylor, West Thomas, North Thomas, East Fletcher, East Thomas, Foote Creek Winter, and South Castle.
- Five holding pastures - Holding Pastures 1, 2, 3, and 4, and one Trap.
- Two pastures removed from grazing.

Type of Grazing System
- Deferred Rotation; See Description Above.

Number of Cattle
- 126 cow/calf (of which 16 are under a second permittee for Foote Creek summer pastures only).

Season of Use
- See Description Above

Percent Utilization
- May 16 - October 15
  45% on range in good condition
  40% on range in fair condition
  30% on range in poor condition
  20% on range in very poor condition
- October 16 - May 15
  45% on range in good condition
  45% on range in fair condition
  35% on range in poor condition
  20% on range in very poor condition

Conservation/Mitigation Measures
- Livestock crossing of the Blue River will be at designated sites with small groups of livestock (20 head or fewer) at one time, in non-loach minnow habitat such as sand, silt, or run areas, and in such areas that are designated annually by a journey-level fisheries biologist prior to removal of livestock.
- There will be no livestock grazing of the East Fletcher Pasture in the Foote Creek Summer area until satisfactory riparian conditions have been achieved on lower Hannagan Creek and Beaver Creek

- Livestock grazing will only occur after August 31 in the West Thomas Pasture to allow for Mexican spotted owl habitat recovery.

Red Hill Allotment

Analysis for this portion of the opinion is based on an undated AMP Revision, February 1, 1999, FONSI and DN, Parts 1 and 2 of a Term Grazing Permit signed March 24, 2001, a 1997 AMP, a 1999 EA, a May 7, 2001, addendum to the BAE, and a May 15, 2001 addendum to the BAE.

Grazing will not occur in the riparian areas along the Blue River on Forest Service lands, as private land boundary fencing constructed in 1998 eliminated livestock access to the occupied loach minnow habitat there. Figure 7 in Appendix B contains a map of the Red Hill Allotment. However, use of all pastures would require periodic crossing of the Blue River via a concrete low-water crossing at Blue Crossing. Because this pasture is used from November through May, these crossings would occur during the breeding season for loach minnow (March through June).

The consultation request for the Red Hill Allotment is for reinitiation of formal consultation for spikedace and loach minnow critical habitat for 1999 decisions to develop AMPs. We included consultation for spikedace and loach minnow as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres

- 7,448 acres
  - 1,002 Full Capacity Range Acres
  - 440 Potential Capacity Acres
  - 5,956 No Capacity Acres
  - 50 Unavailable Acres

The EA notes that approximately 80 percent of the Red Hill Allotment is classified as no capacity range due to accelerated soil loss on sites not capable of producing sufficient litter to protect the site. The EA indicates that these acres are not used to determine the estimated grazing capacity. Additionally, 440 acres are rated as potential capacity due to dense timber stands that produce low amounts of herbaceous forage. Another 50 acres are private land, and classificed as “unavailable”.Therefore, the cattle on this allotment will be grazing approximately 1,450 acres.

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 1999

Number of Pastures
- Five main pastures - Bush Creek, Foote Creek, FS Admin, East River, and Holding.
- Three “no grazing” pastures - North (or River), Bush Trap, and FS Trap

Type of Grazing System
- Deferred rotation - Every pasture on the Red Hill Allotment would receive warm season deferment every year. Every pasture would receive cool season deferment 5 years out of 10. The three river pastures would not be used during the life of the permit.

Number of Cattle
- 15 cow/calf (A temporary one-year grazing permit, which can be issued for up to three years, may be issued for an additional 30 cow/calf, beginning in 2001 and ending in 2003.)

Season of Use
- 11/1 - 5/31

Percent Utilization
- No existing excellent or good range
- 35 percent in fair condition range (with full capacity); 25 percent in poor condition range (with full capacity)
- 10 percent on all potential capacity range, due to mostly very poor range conditions

Conservation/Mitigation Measures
- No livestock grazing on the Blue River riparian corridor on Forest Service lands, resulting in the exclusion of grazing from the North River, FS Trap, and Bush Trap pastures.
- All livestock crossing the Blue River on the Red Hill Allotment on Forest Service lands will be at the concrete low water crossing at Blue Crossing (Forest Road 567).
- Grazing utilization standards will be ten percent lower during the spring on the Red Hill Allotment as necessary where livestock grazing use occurs during these periods because of limited growth prior to summer rains, increased livestock/wild ungulate competition during this period, and lack of other management options, such as a rest rotation system.

Bush Creek Allotment

The analysis for the Bush Creek Allotment is based on information provided in a May 7, 2001, BAE Addendum, a May 15, 2001, BAE Addendum, a December 1, 1999, Term Grazing Permit, Parts 1 and 2, range inspection information for 2000, 2001, and 2002, and previous consultations. Figure 8 in Appendix B contains a map of the Bush Creek Allotment.

The Bush Creek Allotment is a relatively small allotment characterized by steep, rugged, rocky terrain with lower positions of the landscape along the Blue River bottom in private ownership. The proposed action is for grazing of horses only, as noted below. No cattle are permitted to graze on the allotment at this time. The consultation request was for the effects of the action on spikedace and loach minnow critical habitat, and a conference report for Chiricahua leopard frog. Additionally, we included consultation for spikedace and loach minnow as the designation of critical habitat constitutes new

information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 246 acres

Period of Proposed Action
- Three years

Number of Pastures
- Four main pastures - Bush, Bush 1, Bush 2, and Bush 3

Type of Grazing System
- Deferred Rotation

Number of Cattle
- 0 Cattle
- 4 Horses

Season of Use
- 12/1 - 4/20

Percent Utilization
- 25 percent on grass and browse

Fishhook-Steeple Mesa Allotments

The analysis for the Fishhook-Steeple Mesa Allotments was based on a December 5, 1995, Final EA, a September 25, 1995, BAE, a December 5, 1995, DN, a August 30, 2001 Term Permit Modification #1, and a May 5, 2001, BAE Addendum. The Fishhook and Steeple Mesa allotments, while designated separately on maps, are jointly managed (along with the Hannagan and Fish Creek allotments) under two Permittees. The preferred alternative in the Final EA indicated that a total of 39 cow/calf pairs would be authorized for November to June 14, with an additional 16 cow/calf pairs authorized from October 25 to June 14.

Conservation measures for threatened and endangered species, as outlined in the Final EA, include closure of the Grant Creek stream corridor as a driveway, as well as structural improvements, to benefit Apache trout. A utilization rate of 20 - 40 percent was established within Mexican Spotted Owl critical habitat (since remanded and redesignated) in order to maintain prey species habitat needs. Figure 9 in Appendix B contains a map of the Fishhook-Steeple Mesa Allotments.

The consultation request for the Fishhook-Steeple Mesa allotments is for reinitiation of formal consultation for spikedace and loach minnow critical habitat for 1995 decisions on term grazing permits. We included consultation for spikedace and loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 24,200
  - 4,600 Full Capacity Range Acres
  - 5,200 Potential Capacity Range Acres
  - 15,780 No Capacity Range Acres

Period of Proposed Action
- Time remaining on two 10-year Term Grazing Permits issued in 1999 and 2001.

Number of Pastures
- Fishhook, Steeple, Heifer, Bear, and River pastures, and the Grant Creek Shipping Trap and Horse 1 Pasture.

Type of Grazing System
- Deferred Rotation

Number of Cattle
- 55 cow/calf

Season of Use
- 11/1 - 6/14 for 39 cow/calf pairs
- 10/25 - 6/14 for an additional 16 cow/calf pairs

Percent Utilization
- 40 percent utilization on upland grass
- 45 percent utilization on riparian forage

Conservation/Mitigation Measures
- Cattle grazing is excluded from the mainstem Blue River riparian corridor.

Cow Flat Allotment

The analysis for the Cow Flat Allotment is based on an October 6, 1998, AMP, Parts 1 and 2 of a Term Grazing Permit signed July 14, 2000, biological opinion (000089RO), a September 22, 1998 BAE, a March 1,1999, EA, and a May 15, 2001 Addendum to the September 22, 1998, BAE.

Currently the Cow Flat, Foote Creek, PS, and Stone Creek allotments are permitted to the same Permittee. In addition, a second Permittee also uses the Stone Creek Allotment. The Cow Flat Allotment is used in conjunction with the Foote Creek Winter Pasture of the Foote Creek Allotment, and is considered as "winter country". A description of the remainder of the Foote Creek Allotment is provided above.

The consultation request for the Cow Flat Allotment and Foote Creek Winter Pasture is for reinitiation of formal consultation for spikedace and loach minnow critical habitat for 1999 decisions to develop AMPs. Additionally, we included consultation for spikedace and loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

Allotment Acres
- 22,913 acres
  - 8,284 Full Capacity Range Acres
  - 6,412 Potential Capacity Range Acres
  - 8,039 No Capacity Range Acres
  - 178 Private Acres, unavailable range

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 2000.

Number of Pastures
- Five main pastures - Twin, Cedar, Cow Canyon, Lanphier, Tige
- Four other pastures - Riparian 1, Riparian 2, FS, and KK Bar
- Three "No Grazing" pastures

Type of Grazing System
- Rest-Rotation; with each pasture receiving rest every other year. Lanphier Pasture will provide winter/spring pasture one year, while the remainder of the Cow Flat Allotment and the Foote Creek Winter Pasture will provide winter/spring pastures in the alternate year.

Number of Cattle
- 110 cow/calf

Season of Use
- 10/16 - 5/15

Percent Utilization
- 10 percent on PC range acres

- On FC range acres: 20 percent where range condition is very poor; 35 percent where range condition is poor; 45 percent where range condition is fair or good
- 30 percent in riparian areas
- 40 percent on browse in both upland and riparian areas.

Conservation/Mitigation Measures
- Cattle grazing will be excluded from the mainstem Blue River corridor.
- Blue River Crossings made only with small groups of livestock (20 head or less) at a time; in non-loach minnow habitat such as sand, silt or run type habitat, and not in gravel or riffle areas; and in such areas as noted above which are designated by a journey-level fisheries biologist prior to livestock removal from Cow Flat Allotment.

KP and Raspberry Allotments

Analysis for this allotment is based on a September 29, 1995, BAE, a May 15, 2001 Addendum to the BAE, Parts 1 and 2 of a Term Grazing Permit signed November 15, 1999, and a December 5, 1995, Final EA. Figures 11 and 12 in Appendix B provide maps of these Allotments.

The KP and Raspberry allotments are permitted to the same Permittee. They are used together in a yearlong, deferred grazing system. Conservation measures have been taken to benefit threatened and endangered species, as well as sensitive species. These include: 1) implementing forage utilization standards of 20 - 40 percent within Mexican spotted owl critical habitat (which has since been removed from National Forests) to protect habitat for prey species; 2) implementing 20 - 40 percent utilization standards in Northern goshawk management territories; 3) excluding livestock from the Oak Creek Pasture and Raspberry Holding Pasture for the term of the permit, thereby excluding livestock from the Blue River; 4) discontinuing use of KP Creek as a driveway for livestock between winter and summer pastures; and 5) discouraging livestock from accessing 0.5 miles of Bear Wallow Creek until a livestock exclosure is constructed to protect Apache trout.

The consultation request for the KP and Raspberry allotments is for reinitiation of formal consultation for spikedace, and loach minnow and spikedace critical habitat for 1995 decisions to authorize grazing through issuance of term permits. Additionally, we included consultation for loach minnow, as the designation of critical habitat constitutes new information under the reinitiation criteria (50 CFR 402.16). Details of the proposed action are as follows:

<u>KP Allotment</u>

Allotment Acres
- 30,100
  - 11,633 full capacity range acres
  - 3,987 potential capacity range acres
  - 14,519 no capacity range acres

Period of Proposed Action
- Time remaining on a 10-year Term Grazing Permit issued in 1999.

Number of Pastures
- Five main pastures - Summer, Winter, McKittrick, Upper Bear Wallow, and Lower Bear Wallow.
- Three holding pastures - HP #1, HP #2, and Trap

Type of Grazing System
- Deferred Rotation

Number of Cattle
- 46 cow/calf

Season of Use
- Winter livestock grazing only; used in rotation with Raspberry Allotment from November 1 - June 14. Raspberry and East pastures of the Raspberry Allotment and the KP Winter Pasture of the KP Allotment are used for a deferred rotation of cattle during the dormant season of November 1 to March 15, and the spring growing season of March 16 to June 14. Each pasture will receive different livestock grazing use periods each year. The Permittee has waived the Term Grazing Permit for the summer unit of the KP Allotment back to the Forest Service.

Percent Utilization
- 0 - 45 percent utilization of forage and browse in riparian areas;
- 0 - 40 percent utilization of forage and browse in upland areas

Conservation/Mitigation Measures
- Cattle will be excluded from the mainstem Blue River.

<u>Raspberry Allotment</u>

Allotment Acres
- 15,100

Period of Proposed Action
- Time remaining on 10-year Term Grazing Permit issued in 1999.

Number of Pastures
- Three main pastures - Raspberry, East, and Oak Creek

Type of Grazing System
- Deferred Rotation

Number of Cattle
- 46 cow/calf

Season of Use
- Used in rotation with the KP Allotment from November 1 - June 14; KP Allotment now limited to winter livestock grazing only. Raspberry and East pastures of the Raspberry Allotment and the KP Winter Pasture of the KP Allotment are used for a deferred rotation of cattle during the dormant season of November 1 to March 15, and the spring growing season of March 16 to June 14. Each pasture will receive different livestock grazing use periods each year. The Permittee has waived the Term Grazing Permit for the summer unit of the KP Allotment back to the Forest Service.

Percent Utilization
- 0 - 45 percent utilization of forage and browse in riparian areas;
- 0 - 40 percent utilization of forage and browse in upland areas

Conservation/Mitigation Measures
- Cattle will be excluded from the mainstem Blue River.

Pigeon Allotment

The analysis for the Pigeon Allotment is based on the Consultation Forms submitted to the FWS on March 23, 2001, information contained in the Annual Operating Plan for 2000 - 2001, and a March 19, 2002, letter from the Forest Service updating the consultation request.

The proposed action is for a deferred rotation grazing system, with rotation between five pastures. The season is yearlong. The HL Pasture would be used only during the dormant season months between November and April, two years out of every three. Livestock would be removed from the pasture at the time of spring budding of riparian vegetation, or before April 15. The Pat Mesa Unit, which includes Dog Flat, Pat Mesa, and Sunflower Mesa pastures, would be used only during the dormant season between November and April, one year out of every three. Cattle would be removed before spring budding, or before April 15.

The Pigeon Pasture would be used primarily during the spring months prior to summer rains. It may also be rotated for late growing season use every third season, or one year in three. Duration of cattle in the pasture would depend on key area monitoring, with established key areas adjacent to Pigeon Creek.

Cow Canyon and Four Bar pastures would be used as one pasture. Cattle would be placed on Four Bar and allowed to drift through Cow Canyon. These pastures would be deferred during a portion of the growing season.

Steer and Dry Farm Pastures, previously part of the Sandrock Allotment, would now be included as traps within the Pigeon Allotment, and used as part of the Pat Mesa Unit for livestock gathering, working, and shipping only. These pastures would be used for a period not to exceed two weeks,

during April and November, one year in three. The Chitty Trap would be used for livestock gathering, working, and shipping only, for a period not to exceed two weeks. Use would occur twice annually during April and October for a total of 30 days per year. The Wells Trap and Pigeon Creek Trap would be used for livestock gathering only, for a period not to exceed two weeks during April and November, one year in three. Livestock shipping associated with the Pat Mesa Unit would be through the Sandrock shipping corrals and traps.

The Turkey Creek Pasture would be used on a seasonal basis during the winter for horses, November through April 15. Approval to use this pasture would be required annually. The WJ and Holding traps would be used for winter bulls, and as a swing pasture for permitted horses. The Horse Pasture Trap would be used for permitted horses under a deferred rotation system.

Livestock ingress and egress to the Pat Mesa Unit would be across Pigeon Creek via the Clear Creek Trail only. No livestock would be trailed or moved along the corridor of Pigeon Creek, Bear Canyon, or the Blue River. The Blue River Trap was removed from the Pigeon Allotment boundaries.

Figure 13 in Appendix B contains a map of the allotment and pasture boundaries.

This consultation request is for on-going grazing through 2003, or a two-year period, and the effects of that action on loach minnow, Mexican spotted owl, and lesser long-nosed bat, as well as for effects to critical habitat for spikedace and loach minnow. The Forest Service requested concurrence for may affect, not likely to adversely affect determinations for razorback sucker, southwestern willow flycatcher, and bald eagle. The Forest Service additionally requested a conference report for Chiricahua leopard frog. Details of the proposed action are as follows:

Allotment Acres
- 32,473 acres
  - 1,943 full capacity range acres
  - 15,689 potential capacity range acres
  - 14,731 no capacity range acres

Period of Proposed Action
- Two years, until December 31, 2003

Number of Pastures
- Ten main pastures - Turkey Creek, Four Bar, Cow Canyon, Pigeon, Chitty, Horse, HL/Spring Canyon, Pat Mesa, Dog Flat, Sun Flower
- Six holding/shipping pastures - Holding Trap, Shipping Trap, WJ Trap, and Wells Trap; Steer and Dry Farm traps previously on Sandrock Allotment
- One pasture removed from allotment - Blue Trap

Type of Grazing System
- Deferred rotation between 5 pastures

Number of Cattle/Season of Use
- 220 cow/calf (3,484 AUMs) - yearlong
- 20 horses (240 AUMs) - yearlong

Percent Utilization
- 40 percent during the dormant season, 25 percent during the growing season in the uplands.
- 25- 30 percent in Cow Canyon/Four Bar Pastures due to poor to fair range conditions and static trend.
- 25 - 30 percent in Pat Mesa/Wells and Pigeon Pastures due to poor to fair range condition and static to downward trends in localized areas.

Wildbunch Allotment

The analysis for the Wildbunch Allotment is based on Consultation Forms submitted on March 23, 2001, to our office and a March 19, 2002, letter from the Forest Service updating the consultation request. A map of the Allotment and its pastures is found as Figure 14 in Appendix B.

The consultation request was for on-going grazing through 2003, or approximately two years. Formal consultation was requested for loach minnow, spikedace and loach minnow critical habitat, Mexican spotted owl, lesser long-nosed bat, and Arizona hedgehog cactus. The Forest Service also requested concurrence on may affect not likely to adversely affect determinations for razorback sucker, southwestern willow flycatcher, and bald eagle, and a may affect, not likely to jeopardize determination for Mexican gray wolf. A conference report was requested for Chiricahua leopard frog. Details of the proposed action are summarized below:

Allotment Acres
- 23,070 acres
  - 1,158 full capacity range acres
  - 12,404 potential capacity range acres
  - 9,493 no capacity range acres

Period of Proposed Action
- Two Years

Number of Pastures
- Eight main pastures - Joe Fritz, Sandrock, North, Little, Horse, Mud Springs, Roan Cow, and South
- Three other holding/shipping pastures - Weaning, Cienega, and Indian

- One pasture removed from grazing

Type of Grazing System
- Deferred Rotation

Number of Cattle and Season of Use
- 225 cow/calf (3,564 AUMs) - yearlong
- 10 horses (120 AUMs) - yearlong

Percent Utilization
- Uplands - 45 percent during dormant season, 30-35 percent during growing season
- 40-45 percent in Indian and Wildbunch pastures for dormant season, followed by 18 months rest
- 35 - 40 percent in utility traps of North/Joe Fritz and Headquarters trap
- 25 - 30 percent in Horse Pasture to South of Headquarters

Sardine Allotment

The analysis for the Sardine Allotment is based on Consultation Forms dated November 8, 2000, the Attachment to the Biological Assessment for Ongoing Grazing, dated December 15, 2000, and a March 19, 2002, letter from the Forest Service modifying the initial consultation request. Figure 15 in Appendix B is a map of the Allotment and its pastures. This allotment is located on the southern end of the Apache National Forest, within the Clifton Ranger District. It is adjacent and to the northwest of the Hickey Allotment.

The consultation request on the Sardine Allotment is for formal consultation for loach minnow, spikedace and loach minnow critical habitat. Concurrence with your determination of not likely to adversely affect for razorback sucker, lesser long-nosed bat, and jaguar, and concurrence with a not likely to jeopardize determination for Mexican gray wolf, and conferencing on Chiricahua leopard frog was also requested. Details of the proposed action on the Sardine Allotment are as follows:

Allotment Acres
- 6,879 acres
  - 15 acres full capacity rangeland
  - 1,366 acres potential capacity rangeland
  - 5,498 acres no capacity rangeland

Period of Proposed Action
- Ten Years beginning in 2002.

Number of Pastures
- Four main pastures - Sardine, Santa Cruz, Woods, and Lopez

Type of Grazing System
- Deferred Rotation

Number of Cattle/Season of Use
- 2002 - Non-use
- 2003 - 30 cow/calf (475 AUMs) - yearlong
- 2004 - 2012 - 45 cow/calf (712 AUMs) - yearlong

Percent Utilization
- 40 percent in dormant season pastures
- 25-30 percent in growing season pastures

Hickey Allotment

The analysis for the Hickey Allotment is based on the Grazing Consultation Forms submitted on August 21, 2000, updated maps provided on November 8, 2000, an AOP for 2000 - 2001, additional grazing consultation forms included with the Attachment to the Biological Assessment for Ongoing Grazing, dated December 15, 2000, and a March 19, 2002, letter from the Forest Service updating the consultation request. The consultation request is for formal consultation on loach minnow, spikedace and loach minnow critical habitat. Concurrence with may affect, not likely to adversely affect determinations was requested for razorback sucker, southwestern willow flycatcher, lesser long-nosed bat, and jaguar. You also requested concurrence with may affect, not likely to jeopardize for Mexican gray wolf and Chiricahua leopard frog.

Details of the proposed action are as follows:

Allotment Acres
- 24,226
  - 2,832 full capacity range acres
  - 11,643 potential capacity range acres
  - 9,751 no capacity range acres

Period of Proposed Action
- Ten Years beginning in 2002.

Number of Pastures
- Six main pastures - Hickey, Sunset, Little Hickey, Silver Basin, Hamilton, and Rattle Snake Gap
- Three holding pastures - Bird Trap, RU Trap, and Hickey Trap

Type of Grazing System

- Deferred Rotation

Number of Cattle/Season of Use
- 2002 - 45 cow/calf (713 AUMs) - yearlong
- 2003 - 2005 - 233 cow/calf (3,532 AUMs) - yearlong

Percent Utilization
- 40 percent in dormant season pastures
- 30 - 35 percent in summer growing season pastures with deferment

STATUS OF THE SPECIES [rangewide and/or recovery unit]

Spikedace

Spikedace was listed as a threatened species on July 1, 1986 (USFWS 1986a). Critical habitat was designated on April 25, 2000 (USFWS 2000a). Critical habitat includes portions of the Verde, middle Gila, San Pedro, San Francisco, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks and several tributaries of those streams.

Spikedace is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the middle Gila, and upper Gila rivers, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh *et al*. 1990, Sublette *et al*. 1990, Jakle 1992, Knowles 1994, Rinne 1999). The species likely occurs in the upper Verde River, but it has not been documented since 1999 despite annual surveys. Habitat destruction along with competition and predation from introduced nonnative species are the primary causes of the species decline (Miller 1961, Williams *et al*. 1985, Douglas *et al*. 1994).

Spikedace live in flowing water with slow to moderate velocities over sand, gravel, and cobble substrates (Propst *et al*. 1986, Rinne and Kroeger 1988). Specific habitat for this species consists of shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at the downstream riffle edges (Propst *et al*. 1986). Spikedace spawns from March through May with some yearly and geographic variation (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). Actual spawning has not been observed in the wild, but spawning behavior and captive studies indicate eggs are laid over gravel and cobble where they adhere to the substrate. Spikedace lives about two years with reproduction occurring primarily in one-year old fish (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). It feeds primarily on aquatic and terrestrial insects (Schreiber 1978, Barber and Minckley 1983, Marsh *et al*. 1989).

Recent taxonomic and genetic work on spikedace indicate there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations

occupy isolated fragments of the Gila basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek is morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, Tibbets 1993).

When critical habitat was designated, the FWS determined the primary constituent elements for spikedace. Constituent elements include those habitat features required for the physiological, behavioral, and ecological needs of the species. For spikedace, these include permanent, flowing, unpolluted water; living areas for adult spikedace with slow to swift flow velocities in shallow water with shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies at downstream riffle edges; living areas for juvenile spikedace with slow to moderate flow velocities in shallow water with moderate amounts of instream cover; living areas for larval spikedace with slow to moderate flow velocities in shallow water with abundant instream cover; sand, gravel, and cobble substrates with low to moderate amounts of fine sediment and substrate embeddedness; pool, riffle, run, and backwater components present in the aquatic habitat; low stream gradient; water temperatures in the approximate range of 35 to 65 degrees Fahrenheit; abundant aquatic insect food base; periodic natural flooding; a natural, unregulated hydrograph or, if the flows are modified or regulated, then a hydrograph that demonstrates an ability to support a native fish community, and; habitat devoid of nonnative aquatic species detrimental to spikedace or habitat in which detrimental nonnative species are at levels that allow the persistence of spikedace.

The constituent elements are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of spikedace. The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Seven individual critical habitat complexes make up critical habitat for spikedace. Spikedace likely occupy Complex 1, the Verde River Complex, but at reduced numbers. Recent surveys have failed to locate spikedace, but have been less than thorough. The last known records are two fish found in 1999 by the Arizona Game and Fish Department. The tributary streams to the Verde are believed to be unoccupied at this time. Spikedace are not known to occur either historically or currently in Complex 2, the Black River Complex. It is not known if they can exist at the higher elevations found within this complex. Currently, elevation data are not definitive. Additionally, the Salt River Subbasin within this Complex occurs at lower elevations, and is a significant portion of spikedace historical range. This

subbasin currently has no existing populations of spikedace. Large areas of the subbasin are unsuitable, either because of topography or because of reservoirs, stream channel alteration by humans, or overwhelming nonnative species populations.

Within Complex 3, the Tonto Creek Complex, spikedace are known to have occupied Tonto Creek. Suitable habitat still exists, although degradation has occurred due to watershed uses, water diversion, agriculture, rods, and nonnative species introduction. Complex 4, the Middle Gila/Lower San Pedro/Aravaipa Creek Complex, is occupied by spikedace with its population status ranging from rare to common. Aravaipa Creek supports some of the best and most protected spikedace populations due to special use designations on Bureau of Land Management (BLM) land, substantial ownership by The Nature Conservancy, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Complex 5, the Middle-Upper San Pedro River Complex, is currently unoccupied by spikedace. However, the San Pedro River is the type locality of spikedace, and this complex contains important restoration areas. Complex 6, the Gila Box/San Francisco River Complex, is the complex in which the proposed action will occur. The only spikedace population remaining in the complex is in Eagle Creek. However, substantial restoration potential for spikedace exists in the remainder of the complex. This complex has the largest area of habitat suitable for spikedace restoration.

Complex 7, the Upper Gila River Complex in Grant, Catron, and Hidalgo Counties, New Mexico, is occupied throughout by spikedace, and contains the largest remaining population of spikedace. Because of its remoteness, there is a relatively low degree of habitat threats in this complex.

Our information indicates that, rangewide, 155 consultations have been completed or are underway for actions affecting spikedace and loach minnow. The majority of this opinions concerned the effects of grazing (53 consultations), roads and bridges (24 opinions), or agency planning (23 opinions). Additional consultations dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues (USFWS 2001).

The status of spikedace is declining rangewide. Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994c).

Loach Minnow

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS 1986b). Critical habitat was designated for loach minnow on April 25, 2000 (USFWS 2000a). Critical habitat includes portions of the Verde, Black, middle Gila, San Pedro, San Francisco, Tularosa, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks, and several tributaries of those streams. Within

the proposed project area, the northern boundary of the allotment overlaps critical habitat for loach minnow on the San Francisco River (See Map 2, Appendix B).

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley 1973). Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by about 85 percent (Miller 1961, Williams *et al*. 1985, Marsh *et al*. 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White rivers and Aravaipa, Turkey, Deer, Eagle, Campbell Blue, Dry Blue, Pace, Frieborn, Negrito, Whitewater and Coyote creeks in Arizona and New Mexico (Barber and Minckley 1966, Silvey and Thompson 1978, Propst *et al*. 1985, Propst *et al*. 1988, Marsh *et al*. 1990, Bagley *et al*. 1995, USBLM 1995, Bagley *et al*. 1996, Miller 1998).

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al*. 1988; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966). Loach minnow feeds exclusively on aquatic insects (Schrieber 1978, Abarca 1987). Spawning occurs in March through May (Britt 1982, Propst *et al*. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al*. 1988, Vives and Minckley 1990).

Recent biochemical genetic work on loach minnow indicate that there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

When critical habitat was designated for loach minnow, the FWS determined the primary constituent elements for loach minnow. These elements include permanent, flowing, unpolluted water; living areas for loach minnow adults, juveniles, and larvae with appropriate flow regimes and substrates; spawning areas; low amounts of fine sediment and substrate embeddedness; riffle, run, and backwater components; low to moderate stream gradients; appropriate water temperatures; periodic natural flooding; an unregulated hydrograph, or, if flows are modified, a hydrograph that demonstrates an ability to support a native fish community; and, habitat devoid of non-native aquatic species detrimental to loach minnow, or habitat where such nonnative species are at levels which allow persistence of loach minnow. These constituent elements are generalize descriptions and ranges of selected habitat factors that are critical for the survival and recovery of loach minnow.

As noted under spikedace, the appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Therefore, assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel geomorphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

Seven individual critical habitat complexes make up critical habitat for loach minnow. Complex 1, the Verde River Complex, is currently unoccupied by loach minnow. The continuing presence of spikedace and the existence of suitable habitat create a high potential for restoration of loach minnow to the Verde system. Within Complex 2, the Black River Complex contains the Salt River Subbasin, which is a significant portion of loach minnow historical range. However, loach minnow have been extirpated from all but a small portion in the Black and White Rivers. The Black River complex is considered vital to survival and recovery of the species because it is the only remaining population of loach minnow on public lands in the Salt River basin.

Loach minnow are presumed to have occupied Complex 3, the Tonto Creek Complex, as have spikedace. However, no records exist. Suitable habitat still exists, although degradation has occurred due to watershed uses, water diversion, agriculture, roads, and nonnative species introduction. Complex 4, the Middle Gila/Lower San Pedro/Aravaipa Creek Complex, is occupied by loach minnow. Within this complex, Aravaipa Creek supports some of the best and most protected loach minnow populations due to special use designations on Bureau of Land Management (BLM) land, substantial ownership by The Nature Conservancy, and planned construction of fish barriers to prevent invasion of nonnative fish species.

Complex 5, the Middle-Upper San Pedro River Complex, is currently unoccupied by loach minnow. However, the San Pedro River is the type locality of spikedace, and this complex contains important restoration areas. Complex 6, the Gila Box/San Francisco River Complex, includes the proposed action area in this consultation. Most of the complex is occupied by loach minnow, although the status varies substantially from one portion to another. Only Bonita Creek, Little Blue Creek, and the Gila River are currently unoccupied. The Blue River system and adjacent portions of the San Francisco River are the longest stretch of occupied loach minnow habitat unbroken by large areas of unsuitable habitat.

Complex 7, the Upper Gila River complex in Grant, Catron, and Hidalgo counties, New Mexico, is occupied throughout by loach minnow. Because of its remote location, there is a relatively low degree of threats.

As noted above under spikedace, 155 consultations have been completed or are underway for actions affecting spikedace and loach minnow rangewide. The majority of this opinions concerned the effects of grazing (53 consultations), roads and bridges (24 opinions), or agency planning (23 opinions). Additional consultations dealt with timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues (USFWS 2001).

The status of loach minnow is declining rangewide. Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however, work on it is precluded due to work on other higher priority listing actions (USFWS 1994b).

Mexican Spotted Owl

The Mexican spotted owl was listed as threatened on March 16, 1993 (USFWS 1993). The FWS designated critical habitat for the MSO on February 1, 2001 (USFWS 2001).

The American Ornithologists' Union currently recognizes three spotted owl subspecies, including the California (*S.o. occidentalis*), Mexican (*S.o. lucida*), and Northern (*S.o. caurina*). Using starch-gel electrophoresis to examine genetic variability among the three subspecies of spotted owls, Barrowclough and Gutierrez (1990) found the Mexican spotted owl to be distinguishable from the other two subspecies by a significant variation, suggesting prolonged geographic isolation of the Mexican subspecies and indicating that the Mexican spotted owl may represent a species distinct from the California and Northern spotted owls.

The Mexican spotted owl is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. Several thin white bands mark an otherwise brown tail. Unlike most owls, spotted owls have dark eyes. The Mexican spotted owl is distinguished from the California and northern subspecies chiefly by plumage and geographic distribution. The spots of the Mexican spotted owl are larger and more numerous than in the other two subspecies, giving it a lighter appearance. The Mexican spotted owl has the largest geographic range of the three subspecies. The range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico, and discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau. While there are no estimates of the owl's historic population size, its historic range and present distribution are thought to be similar.

The current known range of the Mexican spotted owl extends north from Aguascalientes, Mexico through the mountains of Arizona, New Mexico, and western Texas, to the canyons of southern Utah and southwestern Colorado, and the Front Range of central Colorado (USDI 1995). Although this range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution within this range. This is especially true in Mexico where much of the owl's range has not been surveyed. Information gaps also appear in the species' distribution within the

United States, however, it is apparent that the owl occupies a fragmented distribution throughout its United States range corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands.

The Forest Service is the primary administrator of lands occupied by owls in the United States. According to the Mexican Spotted Owl Recovery Plan (Recovery Plan) (USDI 1995), 91 percent of owls known to exist in the United States between 1990 and 1993 occur on land administered by the Forest Service. The majority of known owls have been found within Region 3 of the Forest Service, which includes 11 National Forests in Arizona and New Mexico. Forest Service Regions 2 and 4, which include two National Forests in Colorado and three National Forests in Utah, support fewer owls.

A reliable estimate of the numbers of owls throughout its entire range is not currently available. Owl surveys conducted from 1990 through 1993 indicate that the species persists in most of the locations reported prior to 1989, with the exception of riparian habitats in the lowlands of Arizona and New Mexico, and all previously occupied areas in the southern states of Mexico. Increased survey efforts have resulted in additional sightings for all recovery units. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico in 1990 using information gathered by Region 3 of the Forest Service. Modifying Fletcher's calculations, the FWS estimated that there were a total of 2,160 owls in the United States (USFWS 1991). While the number of owls throughout its range is not currently available, the Recovery Plan reports an estimate of owl sites based on 1990 - 1993 data. An owl "site" is defined as "a visual sighting of at least one adult owl or a minimum of two auditory detections in the same vicinity in the same year." Surveys from 1990 through 1993 indicate one or more owls have been observed at a minimum of 758 sites in the United States and 19 sites in Mexico. At best, total numbers in the United States range from 777 individuals (assuming one owl per site) to 1,554 individuals (assuming one pair of owls per site).

Past, current, and future timber-harvest practices in Region 3 of the Forest Service, in addition to catastrophic wildfire, were cited as the primary factors leading to listing of the Mexican spotted owl as a threatened species. Fletcher (1990) estimates that 1,037,000 acres of habitat were converted from suitable (providing all requirements of the owl, e.g., nesting, roosting, and foraging) to capable (once suitable, but no longer so). Of this, about 78.7 percent, or 816,000 acres, was a result of human management activities, whereas the remainder was converted more or less naturally, primarily by wildfire.

Mexican spotted owls breed sporadically and do not nest every year. Mexican spotted owls' reproductive chronology varies somewhat across the range of the owl. In Arizona, courtship apparently begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey 1988). Eggs are laid in late March, or, more typically, early April. Incubation begins shortly after the first egg is laid, and is performed entirely by the female. The incubation period for the Mexican spotted owl is assumed to be 30 days (Ganey 1988). During incubation and the first half of the

brooding period, the female leaves the nest only to defecate, regurgitate pellets, or to receive prey from the male, who does all or most of the foraging (Forsman *et al*. 1984, Ganey 1988). Eggs usually hatch in early May, with nestling owls fledging four to five weeks later, and then dispersing in mid-September to early October (Ganey 1988).

Little is known about the reproductive output of the Mexican spotted owl. It varies both spatially and temporally (White *et al*.1995), but the subspecies demonstrates an average annual rate of 1.001 young per pair. There is inadequate data at this time to estimate population trend. Little confidence in initial estimates has been expressed due to its reliance on juvenile survival rates which are believed to be biased low, and due to the insufficient time period over which studies have been conducted.

Based on short-term population and radio-tracking studies, and longer-term monitoring studies, the probability of an adult Mexican spotted owl surviving from one year to the next is 0.8 to 0.9. Juvenile survival is considerably lower at 0.06 to 0.29, although it is believed these estimates may be artificially low due to the high likelihood of permanent dispersal from the study area and the lag of several years before marked juveniles reappear as territory holders and are detected as survivors through recapture efforts (White *et al*. 1995). Little research has been conducted on the causes of mortality of the Mexican spotted owl, but starvation, accidents or collisions, and predation by great horned owls, northern goshawks, red-tailed hawks, and golden eagles may all be contributing factors.

Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and that contain mature or old-growth stands which are uneven-aged, multi-storied, and have high canopy closure (Ganey and Balda 1989, USFWS 1991). In the northern portion of the range (southern Utah and Colorado), most nests are in caves or on cliff ledges in steep-walled canyons. Elsewhere, the majority of nests appear to be in Douglas-fir trees (Fletcher and Hollis 1994, Seamans and Gutierrez 1995). A wider variety of tree species is used for roosting; however, Douglas-fir is the most commonly used species (Ganey 1988, Fletcher and Hollis 1994). Foraging owls use a wider variety of forest conditions than for nesting or roosting. In northern Arizona, owls generally foraged slightly more than expected in logged forests, and less so in selectively logged forests (Ganey and Balda 1994). However, patterns of habitat use varied among study areas and individual birds, making generalizations difficult.

Seasonal movement patterns of Mexican spotted owls are variable. Some individuals are year-round residents within an area, some remain in the same general area but show shifts in habitat-use patterns, and some migrate considerable distances (12-31 miles) during the winter, generally migrating to more open habitats at lower elevations (Ganey and Balda 1989, Willey 1993, Ganey *et al*. 1998).

Mexican spotted owls consume a variety of prey throughout their range, but commonly eat small and medium-sized rodents such as woodrats (*Neotoma* spp.), peromyscid mice, and microtine voles. They may also consume bats, birds, reptiles, and arthropods (Ward and Block 1995). Habitat

correlates of the owl's common prey emphasizes that each prey species uses a unique microhabitat. Deer mice (*Peromyscus maniculatus*) are ubiquitous in distribution in comparison to brush mice (*P. boylei*) which are restricted to drier, rockier substrates with sparse tree cover. Mexican woodrats (*N. mexicana*) are typically found in areas with considerable shrub or understory tree cover and high log volumes or rocky outcrops. Mexican voles (*Microtus mexicanus*) are associated with herbaceous cover, primarily grasses, whereas long-tailed voles (*M. longicaudus*) are found in dense herbaceous cover, primarily forbs, with many shrubs, and limited tree cover. A diverse prey base is dependant on the availability and quality of diverse habitats.

Prey availability is determined by the distribution, abundance, and diversity of prey and by the owl's ability to capture it. Diet studies conducted on Mexican spotted owls have indicated that prey species of the owl include woodrats (*Neotoma* spp.), white-footed mice (*Peromyscus* spp.), voles (*Microtus* and *Clethrionomys* spp.), rabbits and hares (*Sylvilagus* and *Lepus* spp.), pocket gophers (*Thomomys* spp.), and other animals including a variety of bats, birds, insects, and reptiles. Ward and Block (1995) reported that rangewide, 90 percent of an "average" Mexican spotted owl diet would contain 30 percent woodrats, 28 percent peromyscid mice, 13 percent arthropods, nine percent microtine voles, five percent birds, and four percent medium-sized rodents, mostly diurnal sciurids. These rangewide patterns are not consistent among RUs.

Prey that positively influence Mexican spotted owl survival, reproduction, or numbers may increase the likelihood of persistence of spotted owl populations. Male owls must provide enough food to their female mates during incubation and brooding to prevent abandonment of nests or young; accordingly, ecologists suspect that spotted owls select habitats partially because of the availability of prey (Ward and Block 1995). In two studies in Arizona and New Mexico, Ward and Block (1995) found that the owl's food is most abundant during the summer months when young are being raised. Decreases in prey biomass occur from late fall through the winter. Seasonal decreases like these are typical of small mammal populations. Ward and Block (1995) state that conditions that increase winter food resources will likely improve conditions for the owl because this will increase the likelihood of egg laying and decrease the rate of nest abandonment. Thus, food availability in the winter as well as in the summer is important for owl reproduction.

The Recovery Plan provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Protected habitat includes all known owl sites, and all areas in mixed conifer or pine-oak forests with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years, and all reserved lands. Protected Activity Centers, or PACs, are delineated around known Mexican spotted owl sites. A PAC includes a minimum of 600 acres designed to include the best nesting and roosting habitat in the area. The recommended size for a PAC includes, on average from available data, 75 percent of the foraging area of an owl. The management guidelines for protected areas from the recovery plan are to take precedence for activities within protected areas. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas.

The Recovery Plan provides less specific management guidelines for these areas. The Recovery Plan provides no owl specific guidelines for "other habitat".

The range of the Mexican spotted owl in the United States has been divided into six recovery units (RUs) as identified in the Recovery Plan (USDI 1995, Part II.B.). An additional five RUs were designated in Mexico. The recovery plan identifies recovery criteria by RU. The upper Gila Mountain RU has the greatest known concentration of owls sites in the United States. This RU is considered a critical nucleus for the owl because of its central location within the owl's range, and the presence of over 50 percent of the known owls. The other RUs in the United States, listed in decreasing order of known number of owls, are: Basin and Range-East, Basin and Range-West, Colorado Plateau, Southern Rocky Mountain-New Mexico, and Southern Rocky Mountain-Colorado.

At the end of the 1995 field season, the Forest Service reported a total of 866 management territories (MTs) established in locations in Arizona and New Mexico where at least a single Mexican spotted owl had been identified (U.S. Forest Service, *in litt*. November 9, 1995). The information provided at that time also included a summary of territories and acres of suitable habitat in each RU. Subsequently, a summary of all territory and monitoring data for the 1995 field season on Forest Service lands was provided to the FWS on January 22, 1996. There were minor discrepancies in the number of MTs reported in the November and January data. For the purposes of this analysis we are using the more recent information. Table 2, Appendix A, displays the number of MTs and percentage of the total number of each Forest (U.S. Forest Service, *in litt*., January 22, 1996).

The Forest Service has converted some MTs into PACs following the recommendations of the Draft Mexican Spotted Owl Recovery Plan released in March 1995. The completion of these conversions has typically been driven by project-level consultations with the FWS and varies by National Forest.

Critical habitat for the Mexican spotted owl was designated on February 1, 2001 (USFWS 2001). In Arizona, a total of 11 critical habitat units totaling 830,803 acres were designated as critical habitat. The FWS elected to exclude from critical habitat designation those lands where adequate special management considerations or protection are provided by a legally operative plan or agreement that addresses the maintenance and improvement of the primary constituent elements important to the species, and manages for the long-term conservation of the species. The FWS determined that the Southwest Region of the Forest Service amended their Forest Plans in Arizona and New Mexico in 1996 to incorporate the Mexican Spotted Owl Recovery Plan guidelines as management direction, and, as a result, is providing adequate special management for the Mexican spotted owl. Based on this conclusion, the FWS excluded National Forest lands in Arizona and New Mexico from final critical habitat designation. Therefore, no critical habitat for the Mexican spotted owl occurs within the proposed project area.

Since the owl was listed, we have completed a total of 94 formal consultations for the Mexican spotted owl. These formal consultations have identified incidences of anticipated take of Mexican spotted owls

in 262 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only one of these projects (release of site-specific owl location information) has resulted in a biological opinion that the proposed action would likely jeopardize the continued existence of the Mexican spotted owl.

In 1996, the FWS issued a biological opinion on Forest Service Region 3's adoption of the Recovery Plan recommendations through an amendment of their Forest Plans. In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of Mexican spotted owls, with 26 of those PACs located in the Basin and Range West RU, and 92 of those PACs located in the Upper Gila Mountains RU. TO date, consultation on individual actions under the amended Forest Plans have resulted in 194 PACs adversely affected, with 68 of those in the Basin and Range West Recovery Unit, and 83 in the Upper Gila Mountains Recovery Unit.

Chiricahua Leopard Frog

The Chiricahua leopard frog was proposed for listing as a threatened species without critical habitat in a Federal Register notice dated June 14, 2000 (USFWS 2000b). The final rule was published on June 13, 2002 (USFWS 2002). The rule included a proposed special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The frog is distinguished from other members of the *Rana pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds in duration (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Stebbins 1985, Platz and Mecham 1979). The Ramsey Canyon leopard frog (*R. subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it often grows to a larger size and has a distinct call that is typically given under water (Platz 1993).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa (Platz and Mecham 1984,

Degenhardt *et al*. 1996, Sredl *et al.* 1997). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *R. montezumae)* in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of currently extant populations in Arizona occur in stock tanks (Sredl and Saylor 1998).

Populations of the Mogollon Rim are disjunct from those in southeastern Arizona. Based on preliminary analysis of allozymes, the Rim populations may represent a taxon distinct from the southern populations (James Platz, Creighton University, pers. comm. 2000). However, mitochondrial DNA work at the University of Denver does not support this conclusion (N. Benedict, pers. comm. 1999). Additional work is needed to clarify the genetic relationship among Chiricahua leopard frog populations.

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*R. tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-1978) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During extensive surveys from 1995-2000, primarily by Arizona Game and Fish Department (AGFD) personnel, Chiricahua leopard frogs were observed at 60 localities in Arizona (Sredl *et al*. 1997, Rosen *et al*. 1996, FWS files). In New Mexico, the species was found at 41 sites from 1994-1999; eight of 31 of those were verified extant during 1998-1999 (Painter 2000). During May - August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994-1999 (C. Painter, USFS, pers. comm. 2000). The species has been extirpated from about 75 percent of its historic localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Based on Painter (2000) and the latest information for Arizona, the species is still extant in all major drainages in Arizona and New Mexico where it occurred historically; however, it has not been found recently in many rivers, valleys, and mountain ranges, including the following in Arizona: East Clear, West Clear, Silver, Sonoita, Aravaipa, or Tonto creeks, the White, San Francisco or San Carlos rivers, the mainstem of the Verde, upper San Pedro, Santa Cruz, or Babocomari rivers, the Sulphur Springs Valley, or the Pinaleño, Peloncillo, or Huachuca Mountains. In many of these regions Chirichaua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter, USFS, pers. comm. 2000).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and destruction of habitat; water diversions and groundwater pumping; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*R. catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Oronectes virilis* and possibly others), and several other species of fish (Fernandez and Rosen 1988, Rosen *et al*. 1996, 1994; Snyder *et al.* 1996; Fernandez and Bagnara 1995; Sredl and Howland 1994; Clarkson and Rorabaugh 1989). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al*. (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen *et al*. (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al*. 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations winked out due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. However, as numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers have disappeared.

Fire frequency and intensity in the mountain ranges of southeastern Arizona and southwestern New Mexico are much altered from historic conditions. Before 1900, surface fires generally occurred at least once per decade in montane forest with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al*. 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996). Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled in Rucker Lake, a historic Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and

the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) list six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western States), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, "western Africa", and Kenya), Mexico (Sonora), and the United States (eight States) (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al*. 1998, S. Hale pers. comm. 2000). Ninety-four species of amphibians have been diagnosed as infected with the chytrid *Batrachochytrim dendrobatidis*. In Arizona, chytrid infections have been reported from four populations of Chiricahua leopard frogs (M. Sredl, AGFD, pers. comm. 2000), as well as populations of Rio Grande leopard frog (*R. berlandieri*), Plains leopard frog (*R. blairi*), lowland leopard frog (*R. yavapaiensis*), Tarahumara frog, canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*A.t. stebbinsi*) (Davidson *et al*. 2000, Sredl and Caldwell 2000, Morrell 1999, S. Hale pers. comm. 2000). The disease was recently reported from a metapopulation of Chiricahua leopard frogs from New Mexico which may have been subsequently extirpated (C. Painter, USFS, pers. comm. 2000). The proximal cause of extinctions of two species of Australian gastric brooding frogs and the golden toad (*B. periglenes*) in Costa Rica was likely chytridiomycosis. Another species in Australia with diseased individuals may now be extinct (Daszak 2000).

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined; however, it may well prove to be an important contributing factor in observed population decline. Rapid death of recently metamorphosed frogs in stock tank populations of Chiricahua leopard frogs in New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. However, in both cases, symptoms of moribund frogs matched those of chytridiomycosis. Chytrids were recently found in a specimen of Tarahumara frog collected during a die off in 1974 in Arizona. This earliest record for chytridiomycosis corresponds to the first observed mass die-offs of ranid frogs in Arizona.

The origin of the disease is unknown, but disease outbreak data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into native populations with the disease subsequently becoming restricted geographically in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger *et al.* 1998), including global climate change (Daszak 2000, Pounds and Crump 1994). If it is a new introduction, its rapid colonization could be attributable to humans. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and the United States), outdoor pond supplies (United States), zoo trade (Europe and

the United States), laboratory supply houses (United States), and species recently introduced (*B. marinus* in Australia and bullfrog in the United States) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000). Chytrids could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The FWS and the AGFD are employing preventative measures to ensure the disease is not spread by aquatic sampling.

The range of the Chiricahua leopard frog in Arizona can be divided into two general areas: (1) the southeastern part of the state and (2) centered along the Mogollon Rim. Populations occurring on the Clifton Ranger District of the A-S occur within the northern portion of the species' range. Threats to the species occur throughout its range, but the populations above the Mogollon Rim in Arizona appear to be have relatively poor persistence (J. Rorabaugh, USFWS, pers. comm. 2001).

Chiricahua leopard frogs have been documented from aquatic habitats across the A-S. In the Blue River watershed, they were reported during the early 1970s and early 1980s from sites upstream of the allotment along the mainstem of the Blue River and its upper tributaries. Recently, Chiricahua leopard frogs were collected approximately 17 miles upstream of the confluence with the San Francisco River along the mainstem of the Blue River. In 1997, leopard frogs were located six miles above the confluence of the Blue and San Francisco rivers. Chiricahua leopard frogs were reported in the mainstem of the San Francisco River prior to 1995, and continue to occur in the San Francisco River in New Mexico, upstream of the Allotment.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Rana pipiens*) commonly move up to 2,625 feet from their place of metamorphosis, and three young males established residency up to 3.23 miles from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the year northern leopard frogs successfully dispersed to downstream ponds 1.3 miles from the source pond, upstream 0.62 miles, and overland 0.25 miles. At Cypress Hills, a young-of-the-year northern leopard frog moved approximately five miles in one year (Seburn *et al*. 1997). The Rio Grande leopard frog *(Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh in press). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. In August, 1996, Rosen and Schwalbe

(1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.25 - 4.35 miles distant. In the Dragoon Mountains, Arizona, Chiricahua leopard frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 miles down canyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (one mile down canyon from Halfmoon Tank). There is no breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon, thus it appears observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.62 miles away, again, suggesting immigration. Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Displaced northern leopard frogs will return home, and apparently use olfactory and auditory cues, and possibly astronomic cues, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Currently, there is information indicating that some of the frogs in the Blue River area may not be Chiricahua leopard frogs, but lowland leopard frogs. Additional studies will be needed to determine if frogs in this area are Chiricahua or lowland leopard frogs, and to determine if hybridization has occurred (J. Rorabaugh, USFWS, pers. comm. 2002). Until such time as studies are completed, the FWS is assuming that those frogs recorded as Chiricahua leopard frogs were accurately recorded.

Additional information about the Chiricahua leopard frog can be found in Sredl *et al.* (1997), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Platz and Mecham (1984, 1979), and Painter (2000).

Arizona Hedgehog Cactus

Initially, the Forest Service determined that the proposed action was likely to adversely affect Arizona hedgehog cactus, and requested formal consultation for the Pigeon, Sardine, Hickey, and Wildbunch allotments. Since that time, additional genetic studies have determined that this species does not occur outside of the original type locality. Therefore, those cacti previously protected as the listed Arizona hedgehog cactus are no longer considered to occur on the Allotment (Baker 2001). For this reason, this biological opinion will not address effects of the proposed action on Arizona hedgehog cactus.

ENVIRONMENTAL BASELINE [in the action area]

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

A. Status of the Species and Critical Habitat Within the Action Area

Species presence within each allotment is summarized in Table 3 below, followed by a more detailed description in the text following the table.

Table 3. Species Presence/Absence in Allotments within the BO.

Allotment	Species	Critical Habitat for Spikedace and Loach Minnow
Stone Creek	None	None
Upper Campbell Blue	Leopard frogs historically	3.0 miles - East Fork Black River
Turkey Creek	Loach minnow Leopard frogs historically	3.0 miles - Campbell Blue Creek
Bobcat-Johnson	Loach minnow Leopard frogs historically	9.0 miles - Blue River
Foote Creek	None	None
Red Hill	Loach minnow	3.0 miles - Blue River
Bush Creek	Loach minnow	1.0 miles - Blue River
Fishhook-Steeple Mesa	Loach minnow on both allotments	9.0 miles - Blue River
Cow Flat	Loach minnow	3.0 miles - Blue River
KP	None	None
Raspberry	Loach minnow	9.0 miles - Blue River
Pigeon	Loach minnow Chiricahua leopard frog	Small portions of the Blue River border the northern and southern ends of the eastern allotment boundary.

Wildbunch	Loach minnow Chiricahua leopard frog	6.0 miles of the Blue River are within Allotment boundaries, and small portions of the San Francisco River at the western and eastern ends of thesouthern boundary, with remaining sections of the southern boundary separated by 0 to 0.5 miles.
Sardine	Loach minnow	Small fragment of the San Francisco River (< 0.5 miles).
Hickey	Loach minnow Chiricahua leopard frog	10.0 miles of the San Francisco River and 200 yards of the lower Blue River.

Stone Creek Allotment

Neither spikedace or loach minnow occupy this allotment. The Allotment is within the San Francisco watershed, which contains loach minnow. The nearest known loach minnow were caught in Campbell Blue Creek in 1976 (AGFD Database), approximately five miles south of the Allotment, and again in 1978 at the confluence of Campbell Blue Creek and Cat Creek (Silvey and Thompson 1978). They were additionally caught 1.5 miles below Luce Ranch in 1987 (AGFD Database), and below the confluence of Campbell Blue Creek and Turkey Creek in 1988, again approximately six miles south of the Allotment (Sheldon and Hendrickson 1988). Both Stone and Little creeks flow off of the allotment and approximately three miles downstream into the San Francisco River, which contains critical habitat for spikedace and loach minnow. No critical habitat for spikedace or loach minnow exists on this allotment.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog; therefore, the status of leopard frogs within this Allotment is unknown. The Allotment does contain livestock tanks, springs, cienegas, and streams that drain into the Blue River. The nearest known frogs were found in 1971 and 1979, approximately 0.75 miles from the Allotment boundary (AGFD Herp Database, T. Myers, USFS, pers. comm. 1994). Follow up surveys in 1987 and 1995 did not detect frogs. Chiricahua leopard frogs have also been found in other portions of the Blue River, which begins approximately eight or nine miles south of the Allotment's southern boundary. Two unsurveyed large lakes or ponds exists in the southernmost pastures of the Stone Creek

Allotment, but both of these pastures have been designated for no grazing. (It should be noted that these lakes or ponds are identified as such within a GIS layer provided by the Forest Service. The layer classifies these water bodies as either large lakes, large ponds, small lakes, or small ponds. The FWS did not change these layers, but used the same terminology provided by the Forest Service. Waterbodies labelled as "large" may not necessarily appear so, however, in the maps of the allotments.)

Upper Campbell Blue Allotment

Loach minnow occur approximately five miles downstream of the allotment in Campbell Blue Creek. Surveys conducted by the Forest Service in 1993 found two loach minnow each in two separate reaches of Campbell Blue Creek (Forest Service, unpubl. data 1993), and likely persist today. Spikedace are considered to have been extirpated from the San Francisco watershed for approximately 40 years (Propst *et al*. 1986, Sublette *et al*. 1990).

The Upper Campbell Blue Allotment contains approximately 37 miles of perennial and intermittent streams. Campbell Blue Creek is a perennial stream that flows within the allotment for approximately ten miles, and then flows for an additional 2.5 miles where it becomes critical habitat for spikedace and loach minnow. Critical habitat for these two species also occurs downstream of the allotment within the Blue River. Coyote Creek flows through the northeast portion of the allotment, and continues downstream of the allotment for four miles, where it becomes critical habitat for loach minnow. Critical habitat for spikedace and loach minnow is present for the approximately three miles of the East Fork Black River that runs through the West Pasture in the northwest portion of the allotment. Within allotment boundaries, grazing would occur along Campbell Blue Creek as part of the proposed action.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog. Our data indicate that the nearest known frogs were found in 1972 within the Allotment. This site was subsequently surveyed in 1987, 1992, 1993, and 1995, with no frogs detected (AGFD Herp Database 2002). Chiricahua leopard frogs are also known to occur in other portions of the Blue River, which begins approximately six miles south of the Allotment's southern boundary. Frogs were additionally found approximately 0.5 miles from the Allotment boundary in 1979, with additional, unsuccessful surveys in 1987, 1992, and 1995 (AGFD Herp Database), and in 2001 (M. Sredl, AGFD, pers. comm., 1997 - 2001). There are multiple large and one small stock tank, as well as several large ponds (USFS 2002). These water bodies potentially support suitable habitat, but have not been surveyed for frogs.

Turkey Creek Allotment

The Turkey Creek Allotment is occupied by loach minnow. The most recent surveys conducted in June and July of 1998 by the A-S and Arizona State University (ASU) surveyed at the confluence of Campbell Blue Creek and KE Canyon and the confluence of Campbell Blue Creek and Turkey Creek.

Surveyors collected two loach minnow at that time. An abundance of suitable habitat persists today. Young (unpubl. data, 1992) reported capturing 10 loach minnow at and above Turkey Creek on Campbell Blue Creek. Sheldon and Hendrickson (1988) recorded 12 loach minnow from Campbell Blue Creek below the confluence with Turkey Creek, which is within allotment boundaries. Silvey and Thompson (1978) reported capturing one loach minnow on the Campbell Blue above its confluence with Cat Creek, just upstream of the Allotment. Spikedace are considered to have been extirpated from the San Francisco watershed for approximately 40 years (Propst *et al*. 1986, Sublette *et al*. 1990). As noted above, loach minnow were caught in Campbell Blue Creek in 1976 (AGFD Database) and in 1978 at the confluence with Cat Creek, and just above the Arizona/New Mexico Border (Silvey and Thompson 1978). They were additionally caught 1.5 miles below Luce Ranch in 1987 (AGFD Database), and below the confluence of Campbell Blue Creek and Turkey Creek in 1988, approximately six miles downstream of the Allotment (Sheldon and Hendrickson 1988).

The Turkey Creek Allotment contains approximately 25 miles of perennial and intermittent streams. Three miles of Campbell Blue Creek within the Allotment are critical habitat for spikedace and loach minnow. Critical habitat for these two species also occurs downstream of the allotment within Pace Creek, Dry Blue Creek, Campbell Blue Creek, and the Blue River. Critical habitat within Pace Creek is located approximately 1.5 miles downstream of the Turkey Creek Allotment boundary.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog. The Allotment does contain one stock pond in the Turkey Creek A Pasture. Our data indicate that frogs were located within Allotment boundaries in 1979, with no additional frogs detected in subsequent surveys in 1994 and 1995 (AGFD Herp Database 2002). Frogs are also known to occur in the Blue River, which begins immediately downstream of the Allotment.

Bobcat-Johnson Allotment

Loach minnow occur in the Blue River within the boundaries of the proposed Bobcat-Johnson Allotment. Surveys conducted in 1998 at two locations within the allotment found four loach minnow, as documented in the Forest Service's BAE and Bagley *et al*. (1998). Spikedace are generally believed to have been extirpated 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990).

There are approximately 60 miles of perennial and intermittent streams within the allotment. Nine miles of the Blue River are within the allotment boundaries, and all nine miles are critical habitat for spikedace and loach minnow. Critical habitat also occurs upstream and downstream of the allotment within the Blue River and Campbell Blue Creek. There are approximately 20 miles of unnamed drainages within the allotment that flow directly into the Blue River within the allotment. Castle and Buckalou creeks each flow for approximately one mile within the allotment, then flow two more miles downstream of the allotment before entering critical habitat in Campbell Blue Creek. Castle and Buckalou are likely too small and intermittent to support loach minnow habitat.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog. Our data indicate that one survey located frogs within the Allotment boundaries in 1979, with no subsequent detections in a follow-up surveys in 1987 and 1992 (AGFD Herp Database 2002). A second survey in 1979 also located frogs within Allotment boundaries, with no subsequent detections in follow-up surveys in 1987 and 1992 (AGFD Herp Database 2002). The Allotment does contain five large lakes or ponds. Two of these occur in the southern end of the Allotment, in close proximity to the Blue River, but are located in no grazing pastures. Additionally one lake or pond occurs in each of the Nolan, Upper Bobcat, and Castle pastures. Finally, there is one small stock tank in the Upper Bobcat Pasture.

Foote Creek Allotment

Loach minnow occupy habitat approximately three miles downstream of the allotment on the Blue River. Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990). There is no critical habitat within the boundaries of the Foote Creek Allotment.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog, therefore, the status of leopard frogs within this Allotment is unknown. This Allotment does not border or straddle the Blue River, but is separated from the Blue River by approximately three miles (which are part of the Red Hill and Bush Creek allotments). There are multiple lakes and ponds, primarily in the west half of the allotment away from Foote Creek.

Red Hill Allotment

This allotment is occupied by loach minnow. The A-S and ASU conducted studies during June and July of 1998 at the Blue Crossing Campground, within the allotment boundaries, and detected three loach minnow. One loach minnow was also captured at the Blue Camp during this 1998 sampling period (Bagley *et al*. (1998). No surveys have been conducted since that time, but loach minnow likely persists. Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990). The allotment contains critical habitat for spikedace and loach minnow. Three miles of the Blue River within the allotment are critical habitat for spikedace and loach minnow. Critical habitat for these two species also occurs both upstream and downstream of the allotments within the Blue River.

The BAE Addendum for the leopard frog notes that no surveys have been conducted within the Allotment for the frog, therefore, the status of leopard frogs within this Allotment is unknown. The nearest known record of Chiricahua leopard frogs is approximately one mile from Allotment boundaries, and was recorded in 1979, with no subsequent frogs found in 1987 and 1992 follow-up surveys (AGFD Herp Database 2002). The data provided by the Forest Service indicate that there

are no ponds or lakes of any kind within the allotment boundaries, but the Blue River flows north to south through the Allotment.

Bush Creek Allotment

Loach minnow are known to occupy this allotment. Bagley *et al*. (1998) found three loach minnow immediately upstream of the Allotment boundary at Blue Crossing. Approximately one mile of the Blue River is located along the southeastern portion of the allotment. This mile is critical habitat for spikedace and loach minnow. Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990).

No surveys have been conducted specifically for Chiricahua leopard frog within Allotment boundaries; therefore, it is unknown if the species occurs within the Allotment. The nearest known Chiricahua leopard frogs occur in the Blue River, approximately seven miles upstream from the Allotment. Data provided by the Forest Service indicates that there are no ponds or lakes of any kind within allotment boundaries.

Fishhook - Steeple Mesa Allotments

These allotments are occupied by loach minnow. The most recent surveys were conducted in June and July of 1998 by the A-S and ASU. Samples were taken at the Box Area and a section of the Blue River at Blue Camp, both within the boundaries of these allotments (Bagley *et al*. 1998). One loach minnow was located. Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990).

Critical habitat for these species exists within these allotments. The Blue River is perennial within these allotments, including nine miles of critical habitat along the Blue River are found within the allotments. Critical habitat for these two species also occurs both upstream and downstream of the allotments within the Blue River.

No surveys have been conducted within Allotment boundaries for Chiricahua leopard frogs, therefore, the status of frogs within this Allotment remains unknown. However, the Allotment does contain springs, cienegas, and streams that drain into the Blue River. One large lake or pond occurs near the Blue in the Fishhook Allotment. The nearest known Chiricahua leopard frogs were found in the Blue River in 1972 approximately seven miles upstream. Subsequent surveys at this site in 1987 and 1992 did not detect Chiricahua leopard frogs (AGFD Herp Database 2002).

Cow Flat Allotment

This allotment is occupied by loach minnow. The most recent surveys were conducted in June and July of 1998 by the A-S and ASU, and it maintains suitable habitat which likely continues to support the

species. Samples were taken at Blue Camp within the allotment boundaries, and one loach minnow was located (Bagley *et al*. 1998). Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990).

Critical habitat for these species exists within the allotment. The Blue River is a perennial stream within ths allotment, and three miles of critical habitat along the Blue River are found within the allotment. Critical habitat for these two species also occurs both upstream and downstream of the allotment within the Blue River.

The Forest Service indicated that they have not conducted surveys for Chiricahua leopard frog within the Cow Flat Allotment. The nearest known Chiricahua leopard frogs occur approximately four miles upstream, and were captured in 1979. Subsequent surveys in 1987 and 1992 were unsuccessful in locating frogs (AGFD Herp Database 2002). The Allotment does contain livestock tanks, springs and cienegas and streams that drain into the Blue River. Specifically, there are seven large lake or ponds on the allotment, with four in close proximity to the Blue River. These areas have not been surveyed. Additionally, the Blue River runs along the northwestern border of the Allotment.

KP and Raspberry Allotments

The Raspberry Allotment is occupied by loach minnow, but the KP Allotment is not. The most recent surveys were conducted by the Forest Service on June 7, 2000, and found loach minnow at one location within the Raspberry Allotment boundaries and at two locations immediately downstream of the Allotment boundary. The A-S and ASU conducted additional surveys in May and June of 1994. Suitable habitat persists, with no known major changes to habitat quality; therefore, we believe loach minnow persist in this area. Samples were taken from the Blue River at the Smith Place within the allotment, and 32 loach minnow were found. Additionally, Silvey and Thompson (1978) reports finding one loach minnow on the Blue River near Raspberry Creek in 1976. Spikedace are generally believed to have been extirpated from this area 40 years ago (Propst *et al*. 1986, Sublette *et al*. 1990).

Critical habitat for these species exists within the Raspberry Allotment. The Blue River is a perennial stream within this allotment, and nine miles of critical habitat along the Blue River are found within the Raspberry Allotment. Critical habitat for these two species also occurs both upstream and downstream of the Raspberry Allotment within the Blue River.

The Forest Service has not conducted surveys for Chiricahua leopard frog within the KP and Raspberry allotments. The nearest known Chiricahua leopard frogs occur approximately 15 miles upstream, and were captured in 1979. Subsequent surveys in 1987 and 1992 were unsuccessful (AGFD Herp Database 2002). Chiricahua leopard frogs were collected from an additional site approximately 10 miles downstream in 1994 (unpubl. data 2002). However, the Forest Service notes that the Allotment does contain livestock tanks, springs and cienegas and streams that drain into the Blue River. The Blue River occurs on the eastern extremity of the KP Allotment, and there is one large

pond in the middle of the Allotment as well. The Blue River runs north to south through the Raspberry Allotment.

Pigeon Allotment

Short stretches of the northern and southern ends of the Allotment's eastern boundary are formed by the Blue River. Approximately 9.0 miles of the Blue River are adjacent to the Allotment, within the boundaries of the Wildbunch Allotment. Montgomery (1985) found three loach minnow in the San Francisco River in the Sun Flower Pasture area and 90 loach minnow in the Blue River, approximate 0.5 miles upstream of the Blue/San Francisco confluence, near the Blue Trap Pasture. In 1995, loach minnow were caught within the Blue and San Francisco rivers, adjacent to allotment boundaries. Twenty-nine loach minnow were caught in the Blue River at Cienega Creek, adjacent to the Pat Mesa Pasture, 16 additional loach minnow caught in the Blue River at the Blue/San Francisco confluence, and an additional 39 caught in the San Francisco River at Hickey Canyon (Knowles 1995). Nine miles of the Blue and San Francisco rivers within this allotment are classified as critical habitat for spikedace and loach minnow. Spikedace are generally considered to be extirpated from the San Francisco Basin for approximately 40 years (Propst *et al*. 1986, Sublette *et al*. 1990).

The occupancy status for Mexican spotted owls is unknown for this Allotment as no surveys have been completed to date. While it is reasonable to assume that owls may occur, given the presence of suitable habitat and occupancy of nearby areas, it is not possible to conclude with certainty that owls are present. There are approximately 555 acres of restricted and protected habitat along Pigeon Creek, Turkey Creek, HL Canyon, and the San Francisco River. Three PACs have been designated on the Clifton Ranger District in relatively close proximity to the Pigeon Allotment. These are the Dark Canyon PAC, approximately five miles from the Allotment, Brigham Peak PAC, approximately 8.5 miles from the Allotment, and Yam Canyon PAC, approximately 14.5 miles from the Allotment. These PACs partially encircle the allotment, and are located to the southwest, northwest, and northeast of the Allotment. The Forest Service describes habitat quality for Mexican spotted owls between the allotment and these PACs as limited and not contiguous.

Lesser long-nosed bats are not known to occur on the Allotment. Surveys were conducted in 1998 targeting lesser long-nosed bats, and none were captured. No surveys have been conducted for this species within the Allotment. The Consultation Forms note that the nearest known occurrence is located approximately 80 miles southwest of the Allotment. Suitable habitat may occur in pinyon-juniper, grassland, browse, chaparral, and riparian vegetation types within the Allotment; however, there is no concentration of agaves within they allotment. Potential roost sites may occur in caves along steep-walled canyons such as the Blue and San Francisco rivers and Turkey and Pigeon creeks.

Initially, the Forest Service determined that the proposed action was likely to adversely affect Arizona hedgehog cactus, and requested formal consultation. Since that time, additional genetic studies have determined that this species does not occur outside of the original type locality. Therefore, those cacti

previously protected as the listed Arizona hedgehog cactus are no longer considered to occur on the Allotment (Baker 2001).

According to the BAE, this Allotment is occupied, for the length of the Blue River adjacent to the Allotment, by Chiricahua leopard frogs. Although there have been no systematic evaluation of the suitability of habitats in the riparian systems within the Allotment, suitable habitat may occur in portions of the Pigeon Creek and Clear Creek watersheds. The species has been located in the Blue Watershed during the early 1970s and 1980s from sites upstream of the Allotment along the mainstem of the Blue River and upper tributaries. In 1997, Forest Service personnel observed a die-off of leopard frogs approximately one mile upstream of this Allotment, with some of the individuals verified as Chiricahua leopard frogs. Most recently, the species was collected and photographed approximately 12 miles upstream of the Allotment along the mainstem Blue River. The species has not been reported in the mainstem San Francisco River from 1995 to the present, however, they are extant in the mainstem San Francisco in New Mexico. There are eight large ponds or lakes within the allotment boundaries where additional suitable habitat may be present.

Wildbunch Allotment

Loach minnow inhabit the length of the Blue and San Francisco rivers adjacent to the allotment for at least 6.0 and 8.0 miles, respectively, as well as eight miles of the San Francisco River downstream of the Allotment. The Wildbunch Allotment borders the San Francisco River on the south, and is topographically isolated for the majority of the boundary by impassable bluffs. Montgomery (1985) found 90 loach minnow in the Blue River, approximate 0.5 miles upstream of the Blue/San Francisco confluence, in the Cienega South Pasture. In 1995, 29 loach minnow were caught in the Blue River at Cienega Creek, within the Cienega South Pasture. Sixteen additional loach minnow caught in the Blue River at the Blue/San Francisco confluence, again within the Cienega South Pasture (Knowles 1995). Although no surveys have been conducted since 1995, spikedace are generally considered to be extirpated from the San Francisco Basin for approximately 40 years (Propst *et al*. 1986, Sublette *et al*. 1990), while loach minnow likely persist. Critical habitat for both spikedace and loach minnow is present on the allotment for fourteen miles of the Blue and San Francisco rivers adjacent to the Allotment.

The occupancy status for Mexican spotted owls is unknown for this Allotment as no surveys have been completed to date. There are approximately 350 acres of restricted habitat along the Blue River. Additional restricted habitat may occur along some of the perennial drainages, but only as short, narrow stringers of riparian hardwoods. No protected habitat has been identified on the allotment. Three PACs have been designated on the Clifton Ranger District in relatively close proximity to the Wildbunch Allotment. These are the Dark Canyon PAC, approximately 12.4 miles from the Allotment, Brigham Peak PAC, approximately 14.5 miles from the Allotment, and Yam Canyon PAC, approximately 9.8 miles from the Allotment. These PACs partially encircle the allotment, and are located to the southwest, northwest, and northeast of the Allotment. While it is reasonable to assume

that owls may occur, given the presence of suitable habitat and occupancy of nearby areas, it is not possible to conclude with certainty that owls are present.

Lesser long-nosed bats are not known to occur on the Allotment. Surveys were conducted in 1998 targeting lesser long-nosed bats, and none were captured. No surveys have been conducted for this species within the Allotment. The Consultation Forms note that the nearest known occurrence is located approximately 80 miles southwest of the Allotment. Suitable habitat may occur in pinyon-juniper, grassland, browse, chaparral, and riparian vegetation types within the Allotment; however, there is no concentration of agaves within they allotment. Potential roost sites may occur in caves along steep-walled canyons such as the Blue and San Francisco rivers and Turkey and Pigeon creeks.

According to the Forest Service, the Wildbunch Allotment is occupied, for the length of the Blue River adjacent to the Allotment, by Chiricahua leopard frogs. No systematic evaluation of the suitability of habitats in the riparian systems within the Allotment has been completed. The Forest Service considers Cienega, Upper Cienega, and Wildbunch Springs, as well as the perennial stream in Johnson Canyon, as potentila habitat (F. Hayes, pers. comm. 2003). The species has been located in the Blue Watershed during the early 1970s and 1980s from sites upstream of the Allotment along the mainstem of the Blue River and upper tributaries. Most recently, the species was collected and photographed approximately 17 miles upstream of the Allotment along the mainstem Blue River, within the action area. In 1997, Forest Service personnel observed a die-off of leopard frogs within the Allotment, with some of the individuals verified as Chiricahua leopard frogs. The species has not been reported in the mainstem San Francisco River from 1995 to the present, however, they are extant in the mainstem San Francisco in New Mexico.

Sardine Allotment

The San Francisco River in the vicinity of the Allotment is occuiped by loch minnow, however, only a small portion (0.02 miles) of the San Francisco River is adjacent to the Sardine Allotment's southeastern boundary. During the most recent surveys conducted by Knowles (1995), 13 loach minnow were caught in the San Francisco River at the Apache-Sitgreaves National Forest Boundary. Suitable habitat remains, with no major alterations since the 1995 surveys; therefore, we believe that loach minnow persist in this area. This allotment also supports critical habitat for spikedace and loach minnow along one mile of the San Francisco River. Fencing in the Lopez Pasture should exclude cattle from accessing the San Francisco River from this allotment.

Consultation Forms note that Chiricahua leopard frogs were noted on the mainstem of the Blue River in the 1970s and 1980s, per the Consultation Forms for the Pigeon and Wildbunch Allotments. The species was collected and photographed in 1997 on the Blue River approximately 17 miles upstream of its confluence with the San Francisco River. Sardine Canyon, an intermittent drainage, supports approximately five miles of potential habitat (F. Hayes, pers. comm. 2003). The Sardine Allotment also contains one small and three large stock tanks. The small tank is within two to three miles of the

San Francisco River, while the larger tanks are further from the San Francisco River. The tanks have not been surveyed for suitable habitat or frogs. The Consultation Forms conclude that there are 0.1 miles of suitable or potential habitat within the allotment, but that there is no suitable or potential habitat available to cattle for grazing. The Consultation Forms note that springs used for livestock watering are currently protected from livestock grazing by exclosures. The Forest Service notes that most stock tanks on the Clifton Ranger District are ephemeral, often drying up one year in two (F. Hayes, pers. comm. 2003).

Hickey Allotment

This Allotment is occupied by loach minnow. Surveys conducted by Knowles (1995) notes that 39 loach minnow were caught at the confluence of the San Francisco River and Hickey Canyon, which is within the boundaries of the Hickey Allotment. Papoulias *et al*. (1989) found 15 loach minnow at the confluence of the San Francisco River and Hickey Canyon, again within Allotment boundaries. Montgomery (1985) reports finding 15 loach minnow at this same site. Critical habitat for spikedace and loach minnow is present within this Allotment along approximately 10 miles of the San Francisco River and the lower Blue River. Loach minnow have persisted in this area over time, and suitable habitat is still present; therefore, we believe loach minnow likely occupy this area at the present time.

Consultation Forms for the Pigeon and Wildbunch allotments indicate that Chiricahua leopard frogs were noted on the mainstem of the Blue River in the 1970s and 1980s. The species was collected and photographed in 1997 on the Blue River approximately 17 miles upstream of its confluence with the San Francisco River. The Hickey Allotment also contains ten stock tanks and seven springs (F. Hayes, pers. comm. 2003). The small tank is within two to three miles of the San Francisco River, while the larger tanks are further from the San Francisco River. The tanks have not been surveyed for suitable habitat or frogs. Consultation Forms note that there are approximately 12.5 miles of suitable or potential habitat, but that none of this is open to livestock use. The Forms further note that springs used for livestock grazing are protected by exclosures, with only a small number of springs currently not protected from livestock impacts.

B. Factors Affecting Species Environment Within the Action Area

To understand the existing conditions, and the effects of past and present actions on listed species within the proposed project area, it is necessary to understand the history of the Blue and San Francisco rivers, as well as past actions completed within the project area.

Blue River

The Blue River is a seriously degraded ecosystem. Historical observations (Leopold 1921) note that the Blue River was "ruined" and cited it as an "extreme example" of the results of human-caused erosion in the Southwest (Leopold 1921, Leopold 1946). Human uses of the river and its watershed have resulted in extensive changes within the watershed and river channel over time. Although the proportional contribution of natural forces and human forces in stream channel erosion in the southwest has been widely debated, there is substantial evidence that human activities have been a major contributing factor (Duce 1918, Leopold 1924a, Leopold 1924b, Bryan 1925, Leopold 1946, Hastings 1959, Hastings and Turner 1980, Dobyns 1981, Bahre 1991). When European settlement of the Blue River occurred around 1885 or 1886, the floor of the Blue River canyon was "well sodded and covered with grama grass, hardswoods, and pine" (Miller 1961) and the banks were "lined with willows and the river abounded with trout (Leopold 1921). By 1916, it had become a wide, eroded

wash and Olmstead (1919) noted that "Portions of a few of the ranches lying below projecting dikes or in coves have escaped the general destruction of the flood of recent years, but they do not aggregate 200 acres in all and represent less than 8 percent of the original arable area.." The bulk of the flood destruction that Olmstead refers to occurred from 1900 to 1906 and was particularly devastating because it followed the severe drought period of the late 1800s (Bryan 1925, Miller 1961, Bahre 1991). Periodic floods continue to erode remaining fields, homes, and roads (Coor 1992).

Although the proximate cause of the channel erosion was flooding, the flood destruction was enabled and exacerbated by human activities on the watershed and streambanks (Chamberlain 1904, Olmstead 1919, Bryan 1925, Leopold 1946, Miller 1961, Dobyns 1981, Coor 1992). Overgrazing by cattle and goats depleted herbaceous cover of the watershed and streambanks, thus increasing sedimentation; increasing the volume and decreasing the duration of high flows; and decreasing the volume and increasing the duration of low flows. Trapping of beaver contributed to channel degradation and depletion of water storage. Timber harvest, fuelwood, and railroad tie cutting depleted vegetative cover of the watershed, created eroding roads and tracks, and damaged the river channel when logs were rafted downstream during high water. Development of fields on river terraces removed stabilizing riparian vegetation and irrigation canals, and headworks destabilized the channel and funneled floodwaters onto terraces causing them to erode. Roads and trails along the river destroyed riparian vegetation, eroded terraces, destabilized streambanks, and channeled floodwaters into new areas thus eroding new channels or widening the existing channel. Cattle drives along the river bottom broke down streambanks, cut erosion paths, and damaged riparian vegetation. Flood control and protection measures increased velocities, decreased habitat complexity, and destabilized the river through modification and constraint of natural channel geometry. The resulting stream channel is characterized by a wide, shallow channel profile, high levels of sediment, eroding banks, braided shifting channels, and depauperate riparian vegetation (Chamberlain 1904, Leopold 1921, Leopold 1924b, Dobyns 1981, Coor 1992).

Today, much of the Blue River channel is a wide, unvegetated expanse of cobble, gravel, boulder, and sand with a braided and shifting, wide, shallow low-flow channel (Papoulias *et al*. 1989, Bagley *et al*. 1995). River terraces or benches are small eroding remnants of former river banks. Riparian vegetation is sparse and lacking in structural diversity. It consists primarily of seep willow (*Baccharis salicifolia*) and cottonwood (*Populus fremontii*) seedlings and saplings. Some large cottonwoods and sycamore (*Platanus wrightii*) are present, with willow increasingly common in the upper reaches where ponderosa pine (*Pinus ponderosa*) also enters the riparian corridor. Sedges (*Carex* sp.), which are a key element in healthy, stable streambanks, are uncommon along much of the river. Local residents recall a much larger component of bushy willows along the upper Blue River earlier in the century (Coor 1992). Over time, these were replaced by large cottonwood, boxelder (*Acer negundo*), sycamore, and alder (*Alnus* sp.), although local accounts also describe the loss of these big trees to flooding in some areas.

There is little information on the hydrology of the Blue River. Only one U.S. Geological Survey (USGS) streamflow gauge exists on the Blue River. It is located at the Juan Miller or Stacy Crossing (FR 475) , which is within the proposed action area. The gauge functioned on a continuous basis from 1969 to 1991, when it was discontinued. It was maintained as a partial-record station, with only maximum annual discharges reported from 1992 to 1995, when it was reinitiated as a continuous record gauge. The records that exist show a bimodal high flow pattern; a snow-melt hydrograph with high flows in late-winter and spring, and a second high flow period associated with monsoon rains in later summer. The lowest flows generally occur in early summer. At the gauge, the maximum instantaneous discharge for the period of record was 30,000 cfs in 1972; minimum instantaneous discharge was 1.4 cfs in 1978; the median of the yearly mean is 43 cfs; and the 50 percent exceedance level is 12 cfs (USGS 1991, 1996). The Blue River is "flashy" (Gordon *et al*. 1992) with summer storm discharge often an order of magnitude greater than the mean daily discharge on the day of the storm (USGS 1978, 1991, 1996).

Although it is thought that human actions in the Blue River watershed and valley bottom have altered the hydrologic regime of the river, there are no discharge data available prior to the major changes to the river that occurred around the turn of the century. However, increased flashiness of flood flows and depletion of base flows are widely documented results of reduction of vegetative and soil cover from the watershed, loss of floodplain terraces and soils, and reduction of riparian vegetation (Ffolliott and Throud 1975, Dunne and Leopold 1978, DeBano and Schmidt 1989, Gebhardt *et al*. 1989, Meehan 1991, Gordon *et al*. 1992, Naiman 1992, Belsky and Blumenthal 1997). It is likely that these phenomenon are partially responsible for the low base flow that currently exists in the upper Blue River. Local residents recall that there was formerly a more dependable water supply in the Blue River and that over time many residents have been forced to drill wells to obtain dependable irrigation water (Coor 1992).

Present uses of the Blue River watershed and valley bottom continue to contribute to the deteriorated condition of the river, although at a level much reduced from that of the late 1800s. Timber harvest, road, recreation, aquaculture, and grazing activities within the watershed continue to contribute erosion, vegetation change, and alteration of the hydrologic regime (see PFC analyses for various allotments). Private lands in the system are concentrated in the upper 30 miles of river bottom. Some cropping and irrigated agriculture continues on remnant river terraces that have natural protection from flood erosion. There are a number of small diversion structures and irrigation canals and an unknown number of wells, at least some of which pump from the alluvial aquifer. Subdividing of ranch lands and construction of residences or summer homes has occurred, but at a fairly low level. The County Road (FR 281) is a continuous source of bank and channel damage and erosion, although efforts continue to try and lessen this impact. Numerous low-water ford crossings exist in the upper Blue River contributing to localized destabilization. In the middle and lower Blue, unauthorized off road vehicle use continues to occur in the river bottom. Livestock grazing in the valley bottom continues on private lands in the upper Blue. There is livestock grazing on Forest Service lands within the watershed, but grazing along the mainstem river bottom is being curtailed through Forest Service efforts.

Forest Road 212, originating in Clifton, travels along the San Francisco River to the Martinez Ranch and overland back to Highway 191. About 18 miles of roadway exist within the corridor, 12 miles of which are on Forest Service lands, 9.5 of which are within the Hickey Allotment. The last maintenance conducted by Greenlee County on the roadway within the riverine corridor occurred in 1998 under formal consultation. Only six crossings above the Forest boundary were maintained. There are 35 crossings within the river corridor of the San Francisco River in the Hickey Allotment. In normal moisture years, access is generally limited to between May 15 and January 1 because of high water levels, and use is highest normally during June through August.

Our database indicates that a total of approximately 47 actions on the Apache-Sitgreaves National Forest have undergone or are undergoing section 7 consultation. The most common (22 consultations) addressed the effects of grazing. Other projects involved agency planning, roads and bridges, timber harvest, fire, flooding, and recreation. The Blue River has undergone six formal consultations, while the San Francisco River has undergone four formal consultations. The trend in the number of formal consultations occurring on the Apache-Sitgreaves National Forest has been an increase over time, with 1 formal occurring in 1990, two occurring in 1995, three occurring in 1999, and seven occurring in 2001.

The Arizona Department of Environmental Quality (ADEQ) has determined that the sediment violations on the Blue River should be removed from the Water Quality Limited Waters List. This list consists of surface waterbodies that do not meet state water quality standards. The ADEQ determined that the Blue River, among others statewide, could be removed from the list at least in part because the geology of the Blue River Watershed is extremely unstable, noting the large number of landslides that have occurred in the area (ADEQ 2000). A similar conclusion was reached by the Forest Service, following completion of a geomorphic analysis of the Blue River (Inman 2000). These two documents indicate that the sediment load in the Blue River is affected in part by natural conditions.

The Forest Service has provided photographic evidence to this office of riparian vegetation regeneration. A report completed by the national Riparian Service Team (NRST 2001) also remarks that, despite near complete de-stabilization of the Blue River, there is remarkable evidence of recovery, especially on Forest Service administered lands. The report indicates that cottonwood and willow regeneration is doing well on segments above Blue Camp. One segment was rated as functioning properly; however, excess bed load and associated scour continue to limit plant establishment in other places. The report notes that big game browsing may inhibit new recruitment of woody species, and that this type of browsing was notable in open meadow sites.

The National Riparian Service Team (NRST) (2001) notes that the interaction of historical effects and on-going effects have resulted in a Blue River system that is severely altered. They note that the removal of large wood, continuous year-long grazing historically, a reduction in resistance forces (i.e., large woody material and riparian vegetation), road construction and maintenance, and channelization

and diking are all effects that occurred historically and appear to be continuing to some degree along the Blue River.

With respect to overall channel stability for the Blue River, the NRST notes that the access of frequent floodflows to floodplains, sinuosity, width/depth ratio, and gradient all play an important role in how well a stream dissipates energy. The report finds that, in most of the Blue River drainage, frequent floodflows are not capable of reaching a relatively flat floodplain for energy dissipation, sediment deposition, and periodic flooding of riparian vegetation. The channel is described as downcut and widened, so that the amount of water that used to fill the channel and spill over onto the floodplain is now contained within the deeper, wider channel. The high, infrequent flood flows do reach the terraces where high flow channels are present. A reduction in resistance forces (i.e., the loss of large woody material an riparian vegetation) and an increase in water velocity (due to channelization, diking, or other effects)has resulted in an increase in the energy of water flow. The increased energy eroded the streambed and streambanks, and was significant enough to produce rapid vertical adjustments to the channel network, disconnecting the channel from its floodplain. The report concludes that "The hydrology attributes and processes of the Blue River have been highly altered, and contribute to the functional-at-risk to nonfunctional condition of most of the drainage. (NRST 2001)"

The NRST notes that channel morphology and associated habitat characteristics for the loach minnow, as well as water quality parameters, can be expected to change very slowly over time with measurable change detectable only after a period of years and in many cases decades. Additionally, the dynamic nature of these systems leads to recovery rates that are less than constant. The NRST anticipates that changes can be expected to exhibit periods of short-term downward trends embedded within a long-term upward trend. The report notes that historical removal of large wood, continuous year-long grazing practices in the past, reduction in resistance forces, road construction, reconstruction and maintenance, and channelization and diking all contributed to channel instability. General management recommendations were made for each of these issues. The report concludes that no one factor is the primary cause of the degradation, recommends management for each of the impacts to the channel:

> "When conditions throughout the entire watershed are considered, however, it becomes evident that roads are one of many problems that need addressing but may not be "at the top of the list" of the watershed stressors. This means that care must be taken to avoid focusing too much time and effort on road problems at the expense of addressing larger watershed scale problems that left unattended will assuredly lead to the extinction of the listed species (NRST 2001)."

<u>San Francisco River</u>

The San Francisco River has undergone substantial modification within the past century and a half. In 1846, the mouth of the San Francisco was described as having thick borders of flags (*Iris* sp.) and willows with some larger cottonwood, and beaver dams in "great numbers" (Emory 1848). Beavers were abundant along the San Francisco River in the 1800s (Pattie 1833). By the turn of the century,

beaver had been reduced to a minor element in the system. Agriculture, livestock grazing, roads, mining, timber harvest, and other human activities within the watershed had substantially altered the hydrologic and sediment regimes and the river channel (Olmstead 1919, Leopold 1946). Extensive wood harvest of all types for timbers and fuel at the mines at Clifton-Morenci, and the fuelwood needs of the local population, decimated both the upland and riparian woodlands (Bahre 1991). In addition to the water diversion, wood harvest, roads, and toxic discharges resulting from the mines in the Clifton area, placer mining was practiced on the San Francisco River above Clifton (Dobyns 1981). Large floods in the 1890-1906 period accelerated the erosion of the destabilized watershed and stream resulting in a river channel similar to that present today.

Because of canyon influences, the San Francisco River upstream from the Blue River remains relatively well-defined and moderately vegetated with cottonwood, willow, ash, walnut, sycamore, and seep willow (*Baccharis salicifolia*). The substrate is boulder, cobble, gravel, and sand. After its confluence with the Blue River, the lower San Francisco River channel becomes progressively wider, and is a sparsely vegetated expanse of cobble, gravel, boulder, and sand with a braided and shifting wide, shallow, low-flow channel. River terraces, which were only moderately eroded above the mouth of the Blue River become small, eroding remnants of former river banks. Riparian vegetation consists primarily of seep willow, cottonwood, and nonnative salt cedar (*Tamarix* sp.) and is lacking in structural diversity. The Forest Service notes that limited new floodplain development is occurring, and is accompanied in some areas by willow, cottonwood, and boxelder.

A stream discharge gauge is located on the San Francisco River at Clifton. The period of record of that gauge is continuous from 1927 to present, with sporadic records from 1910 to 1927. The San Francisco River shows a bimodal discharge pattern: a snow-melt hydrograph with high flows in late winter and spring and a second high flow period associated with monsoon rains in late summer. At the gauge, the maximum instantaneous discharge for the period of record is 90,900 cubic feet per second (cfs) from October 1983; the minimum daily discharge is 6.1 cfs from June 1971; the monthly mean discharges range from 57 cfs in June to 454 in March; and the 50 percent exceedance level is 76 cfs (USGS 1999). The San Francisco River is "flashy" with storm discharges substantially larger than mean daily discharge on the day of the storm (USGS records).

Present uses of the San Francisco River watershed and valley bottom within the action area continue to contribute to the deteriorated condition of the river, although at a level reduced from that of the late 1800s to early 1900s. Road, and grazing activities within the watershed continue to contribute to erosion, vegetation change, and alteration of the hydrologic regime. Although the lower San Francisco River above Martinez Ranch was closed to vehicle use in 1987, some unauthorized use by the public continues. On the road below Martinez Ranch there are several low-water crossings. On the road from the RU Ranch to Clifton, there are 26 low-water crossings within 8.7 miles. Forest Service lands along the San Francisco River in Arizona have been excluded from livestock grazing, although occasional trespass use occurs. Livestock grazing in the river continues on BLM and State Lands.

Past Actions

According to Project Record Documentation (PRD) provided by the Forest Service within the project files, numerous activities have occurred within the proposed action area, including fire, timber sales and related treatments, previous livestock grazing, and recreation and travelway use. This information was summarized in a PRD for the Red Hill Allotment. No PRD information was found for the San Francisco River Watershed. With respect to fire, the Forest Service note that wildfires of all sizes have burned within the watersheds in the proposed project area. They note that the majority of wildfires are less than an acre. Larger fires in the past 20 years include the Rhette Fire, which was a prescribed natural fire of approximately 19,120 acres in 1996; the Horse Prescribed Natural Fire (PNF) in 1979 (16,000 acres); the S Canyon Fire in 1994; the Red Wildfire in 1995 (4,000 acres); the Whiterocks Wildfire in 1995 (3,000 acres); the Peak Fire use PNF in 1998 (2,000 acres); and the Amos Fire in 2,000 (1,300 acres). Watershed effects are described as being within the regional soil quality guidelines and within tolerance for water quantity and quality effects based on the aerial extent of the severe burn portion of the burn (approximately 2,100 acres).

No significant watershed effects were documented within the Blue or Black River watersheds as a result of timber sales and related treatments. Within the Upper and Middle Blue River watersheds, timber sales listed occurred between 1983 and 1993, impacting a total of 38,291 acres, or 39.7 percent of the overall Upper Blue River Watershed, and 6 acres, or 0 percent of the Middle Blue River Watershed.

Details provided on livestock grazing noted that, since 1995, grazing by livestock has been analyzed for compliance with Forest Plan standards and other lands. The summary provided notes that, for permitted use numbers, grazing is within capacity on approximately 71 percent of the Forest portion of the Upper Blue River Watershed, and on 53 percent of the Forest portion of the Lower Blue River Watershed at the time of the PRD publication. However, it was noted that grazing was expected to be within capacity on all allotments in the Blue River Watersheds by 2005. The recovery to satisfactory watershed conditions on capable range is expected to occur within one to two decades after full implementation of grazing allotment decisions in most areas. The Clifton Ranger District notes that, in many cases, actual stocking rates have been well below capacity and allowable stocking rates in the recent past. For example, the validated stocking for 2002 was at 0 percent stocked for the Sardine Allotment, at 36 percent stocked for the Hickey Allotment, at 65 percent stocked for the Wildbunch Allotment, and at 38 percent stocked for the Pigeon Allotment.

An additional impact that has occurred in the past on the Blue River is road maintenance and water diversions through the middle portions of the Blue. The FWS has consulted previously on road repair activities on numerous occasions, including road repairs to Forest Service Road #281 (2-21-94-F-243), Forest Road 212 (2-21-96-I-233), and Forest Service Road #475 (2-21-95-F-166). Additionally, one informal consultation was conducted on the San Francisco River Road from Clifton to the Blue River (2-21-96-I-233). Similarly, a consultation was completed on the Upper Blue River

powerline repair (2-21-97-F-136). Consultation has also occurred on fish issues, including the Blue River Fish Hatchery (2-21-95-F-307), and the Blue River Fish Barrier (2-21-00-F-364). Table 4 includes a summary of past consultations on the Apache-Sitgreaves National Forest.

Actions taken by private individuals along the Blue River have also affected river health. There are approximately 12 active surface water rights held on the Blue River by private individuals. Many of these rights have been in existence since the late 1800s or early 1900s. Due to conditions on the river, channel incision has occurred, making diversion of water allocations to these individuals more difficult. Larger diversions have been constructed on numerous occasions in the past, the most recent occurring in 2002. These diversions have, in some instances, stretched across the entire channel, causing at least temporary dewatering of the stream, and, as they erode, increasing sediment loads in the channel. Because the source of sediment is not entirely known, it is difficult to determine if contamination issues may also be a problem associated with construction of diversions. The Forest Service is currently working on a solution that will allow diversion construction to occur in a manner which is less detrimental to stream health. An additional problem with water diversions at this time is the lack of gages for use in measuring water withdrawals. Each individual is entitled to a certain number of acre feet per year. However, with no gage measuring the actual water withdrawn, it is possible that excessive water is being withdrawn from the channel. In addition, return flows to the river are, in some instances, creating headcutting, and may be carrying contaminants into the channel from pesticides or fertilizers used in agricultural operations on private lands.

We note that the Forest Service has recently made substantial changes to the grazing actions on the Alpine Ranger District. These changes, which were instituted beginning in 1996 involved the reduction of herds by 1/3 of the remaining herd each year for three consecutive years. This change is permanent, and reflected in the Term Grazing Permits for these allotments. The amount of time that has elapsed since the reduction is insufficient to allow a determination of effects on the range, soil, and riparian conditions present on these allotments. However, we believe that the reduced number of cattle, and in some cases, season of use, will be beneficial to the Blue and San Francisco rivers and to spikedace and loach minnow, and their habitat. Similarly, the Clifton Ranger District took administrative action to remove livestock from the Blue and San Francisco river corridors. Documentation on these actions has yet to be completed. The Clifton Ranger District has also maintained a standing Notice of Impoundment for riverine corridors, and has used this method to impound unauthorized livestock and cite non-permittees.

Climatic Conditions

While climatic conditions vary from year to year, it is possible to understand the current conditions and manage to accommodate those conditions. The Water Supply Outlook Report for March, 2002 (USDA-NRCS 2002) indicates that the snowpack for the San Francisco-Upper Gila River Basin is at 35 percent of its 30-year average as of March 1. Streamflow levels for the San Francisco-Upper Gila River Basin are predicted to be well below median. The forecast indicates that flows will be at 20

percent of median streamflow levels in the San Francisco River through May. Monthly precipitation for February 2002 was at approximately 38 percent of average, and at 35 percent of average for the year to date. These conditions indicate that drought or drought-like conditions will occur in the area of the proposed action, for at least 2002.

Allotment Conditions

For the proposed action area, the Forest Service noted within the May 15, 2001, addendums to the original allotment BAEs for the Upper Campbell Blue, Turkey Creek, Bobcat-Johnson, Red Hill, Bush Creek, Fishhook-Steeple Mesa, Cow Flat, KP and Raspberry allotments that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors. These factors include removal of large wood, livestock grazing, loss of riparian vegetation, road construction and maintenance, and stream channelization associated with agricultural development and road protection and maintenance." Additional detail about these effects can be found in the Blue River watershed report (NRST 2000). The addendums further note that "Degraded riparian and aquatic habitat conditions within the allotment are the result of past and ongoing management actions that have resulted in reduced ground cover and other vegetative and physical alterations of upland and riparian conditions. These impacts and alterations to hydrologic processes have resulted in changes to stream channel morphology and other physical, biological, and chemical characteristics of aquatic and riparian habitat within and downstream of the allotment." The Forest Service provided site specific information on baseline conditions within each of the allotments, as detailed below.

In reviewing the allotment specific information, it is important to understand the methodologies used by the Forest Service to provide rankings for each allotment. For example, in evaluating soil health, estimated rates of annual soil loss were developed using the Universal Soil Loss Equation (USLE) from the Terrestrial Ecosystems Survey (TES) of the A-S. The USLE predicted rates soils as being in one of four categories: 1) Potential, meaning soil loss has reached the maximum extent possible and there is no vegetation; 2) Tolerance, meaning the maximum rate of soil loss that can occur while still maintaining inherent site productivity; 3) Current, meaning the existing condition; and 4) natural, meaning the minimum rate of soil loss, where the vegetation community has reached its peak or climax. These soil loss categories indicate the ability of soil to withstand such uses as grazing given adequate ground cover of litter and vegetation.

Soil and range health are linked. The Forest Service notes that an allotment has different range capabilities, or abilities to support cattle grazing, depending in part on their soil loss categories. (Other factors, such as the palatability of vegetation, must also be considered when determining range capability). Three soil stability classes have been developed, based on the four categories above. These soil stability classes are stable, impaired stability, and unstable. Additionally, range capability is linked to soil stability class. Stable soils are considered as full capability range. These soils are considered to be in satisfactory condition because both the current rate of soil loss and the natural rate of soil loss are less than the tolerance rate.

Impaired stability soils are considered as potential capability range. Impaired stability soils are those where the current soil loss rate is greater than the tolerance rate AND the natural soil loss rate is less than tolerance rate. This may be due to such factors as inadequate ground cover or compacted soil structure. Impaired stability soils are considered unsatisfactory because they indicate that the watershed is not fully functioning due to soil and site productivity losses. Documentation provided by the Forest Service (i.e., Environmental Assessments for various allotments on the Forest) note that these areas should not be grazed unless proper management is in place.

Unstable soils are considered as no capability range. Unstable soils occur when natural soil loss rate is greater than tolerance soil loss. The final EA notes that no amount of management can reverse this relationship due to inherent soil properties. Forest Service documentation additionally notes that, while grazing may be occurring on areas with unstable soils where it has not been specifically excluded, such areas are unsuitable for grazing and livestock capacity should not be based on them.

Stone Creek Allotment

This Allotment was consulted on previously, under the regional term grazing consultation (2-22-99-F-016), completed June 30, 1999. The Forest Service concluded that the proposed action was not likely to adversely affect loach minnow and spikedace, and the FWS concurred. Critical habitat was not addressed at that time.

Details on Allotment conditions are as follows:

Elevation
- 7,800 - 9,800 feet

Major Vegetation Types
- Ponderosa Pine - 42 percent
- Mixed Conifer - 16 percent
- Aspen - 10 percent
- Spruce-Fir - 10 percent
- Pinyon-Juniper - 9 percent
- Grassland - 7 percent
- Oak Woodland - 6 percent
- Private - 0 percent

Major Drainages
- Little and Stone creeks

Watershed Condition

Overall Watershed Condition:

- Paddy Creek is within the Little Colorado Watershed, and the San Francisco River is within the Upper Gila Watershed. No condition data provided.

Within the Allotment:

- No data provided.

Soil Condition

- 78 percent Stable (Satisfactory)
- 22 percent Impaired (Unsatisfactory
- 0 percent Unstable (Unsuited)

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	83	<1
Fair	2,339	19
Poor	6,476	52
Very Poor	3,339	27

The Forest Service provided additional information on allotment conditions at an August 14, 2002, meeting. Forest Service personnel described both the Stone Creek drainage and the Bob Thomas Creek as being primarily in poor or very poor condition. Conditions on the allotment generally were described as steep, with large amounts of bare ground, and personnel noted that grazing occurs in the drainages on this allotment due to the topography. Alternatively, the Terry Flat Pasture has a dense overstory of mixed conifer and aspen, with large amounts of litter. Little Creek within the Little Creek and Lower Little Creek pastures is downcutting. Vegetation, including that at the channel's edge, is upland. There are few aquatic plant species in the channel. There is generally a lack of cobble and boulder to dissipate stream energy. Cattle do use these channels for water, but are grazing in the uplands (C. Painter, USFS, pers. comm. 2002). Personnel noted that utilization of this allotment was high, exceeding standards (J. Ward, USFS, pers. comm. 2002).

Utilization Levels

The Forest Service provided information on range monitoring for 2000 - 2002. Stone Creek was in non-use for 2000, but monitoring was completed to evaluate wild ungulate use.

Riparian Condition

No specific information provided. The AMP notes that "riparian areas are in poor condition". It further notes that "Riparian areas are basically void of any suitable cover for this species" in the cat/wolf species section. The AMP notes for both Stone and Little creeks that "Both creeks are in poor condition."

Upper Campbell Blue Allotment

Previous consultation was completed on this allotment on April 29, 1996. In that consultation, the Forest Service requested concurrence with a finding of "is not likely to adversely affect" for loach minnow. The FWS did not concur with this determination for the Upper Campbell Blue Allotment.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Upper Campbell Blue Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." The stream channel has incised and widened, and most of the channel consists of unstable and eroding streambanks, with no vegetation present." The BAE Addendum further notes that "These impacts and alterations to the hydrologic processes have resulted in changes to stream channel morpohology and other physical, biological, and chemical characteristics of aquatic and riparian habitat within and downstream of the allotment." Additional details on Allotment conditions are as follows:

Elevation
- 7,600 - 9,050 feet above sea level

Major Vegetation Types
- Ponderosa pine - 12,000 acres
- Mixed conifer - 6,600 acres
- Aspen - 200 acres
- Meadow and Riparian vegetation - 870 acres

Major Drainages
- East Fork Black River, and Campbell Blue, Cienega, Coleman, and Turkey Creeks

Watershed Condition
- Overall watershed condition:
  - Upper Blue 5th Code Watershed - satisfactory condition
  - Upper Black 5th Code Watershed - satisfactory condition
- Within the Allotment: No data provided.

Soil Conditions

- 94 percent Stable (Satisfactory)
- 6 percent Impaired (Unsatisfactory)
- 0 percent Unstable (Unsuited)

Range Condition - The Forest Service collected range and soil condition information or the allotment in 1983, which showed that four percent of the allotment is in excellent/stable condition, five percent is in good/upward condition; 41 percent is in good/stable condition; seven percent is in fair/upward condition, 23 percent is in fair/stable condition, three percent at poor/upward condition; 16 percent at poor/stable condition, and less than one percent at poor/downward condition.

From Pace transects during the Fall of 1999, the Forest Service determined that range condition varied from poor with a downward trend to good with a downward trend, and that soil condition varied from poor with a downward trend to fair with a stable trend. The Forest Service concluded that problems observed in the allotment included stocking rate and accessive use on key areas. The Forest Service characterized elk use as common on all pastures. The Forest Service concluded that in 1999, 50 percent of the soil condition measurements are not meeting Forest Plan standards, and that 50 percent of the range condition measurements are not meeting Forest Plan standards.

Again, higher levels of utilization are concentrated along bottom areas, and particularly along the entire length of Campbell Blue Creek above its confluence with Cienega Creek, the lower portion of Cienega Creek, and those portions of Campbell Blue downstream for approximately 0.75 miles after its confluence with Cienega Creek.

Riparian Condition
- 10 percent Satisfactory Condition
- 90 percent Unsatisfactory Condition

Riparian areas within the Upper Campbell Blue Allotment total 13 miles. These river miles occur along Campbell Blue Creek, Coleman Creek, and East Fork of the Black River. Portions of Campbell Blue Creek are designated as critical habitat for spikedace and loach minnow. The BAE Addendum notes that most of Campbell Blue Creek within the Allotment is a low-gradient alluvial stream channel that has been severely altered by livestock grazing and activities occurring on private land. The stream channel is described as incised and widened, with unstable and eroding streambanks, and no vegetation present. Generally, the riparian condition decreases with increasing stream reach number, so that areas at the lower end of Campbell Blue Creek received lower riparian condition scores than those at upstream reaches (USFS unpubl. data 1997).

The BAE notes that the majority of livestock use occurs in riparian areas or drainages, due in part to the limited management by the Permittee, resulting in a lack of distribution of cattle during the pasture use period. The Forest Service provided additional information at an August 14, 2002, meeting indicating that significant downcutting is occurring in portions of Campbell Creek in the Cienega

Pasture. Cienega Creek subsequently joins the Campbell Blue Creek, which then flows downstream to join Coleman Creek and become the Blue River. Conditions on Cienega Creek are poor towards its confluence with Campbell Blue Creek, becoming wider and more downcut. The upper end is narrow and shallow. The area supports primarily upland vegetation, and bluegrass represents the dominant forage. A few *Carex* sp. are present as well. The upland areas, support fescue, and where open, screwleaf and mountain muhly. However, cattle tend to remain in the bottoms of drainages. The upland areas, according to Forest Service personnel, are in relatively good condition, but the bottoms of drainages are not (C. Eppler, USFS, pers. comm. 2002).

Turkey Creek Allotment

Previous consultation was completed on this allotment, concluding on April 29, 1996. In that consultation, the Forest Service requested concurrence with a finding of "is not likely to adversely affect" for loach minnow. The FWS did not concur with this determination for the Turkey Creek Allotment.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Turkey Creek Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." The BAE further notes that "...the existing conditions of the aquatic and riparian habitat within the allotment are highly degraded from past and ongoing management activities, and provide little or no buffering or filtering capability before entering critical habitat within Pace Creek, Dry Blue Creek, Campbell Blue Creek, and the Blue River." Additional details on Allotment conditions are as follows:

Elevation
- 6,300 - 8,700 feet

Major Vegetation Types
- Ponderosa pine (7,960 acres)
- Pinyon-juniper woodland (1,500)
- Mixed conifer (850 acres)
- Meadow and Riparian (131 acres)

Major Drainages
- Turkey Creek, Campbell Blue River

Watershed Condition
- Overall Watershed Condition:
  Upper Blue 5th Code Watershed - Satisfactory
- Within the Allotment:
  No data provided.

Soil Conditions
- 27 percent Stable (Satisfactory)
- 23 percent Impaired (Unsatisfactory)
- 50 percent Unstable (Unsuited)

Range Condition - Unknown. Per Forest Service personnel, the Turkey Creek Allotment has not been used by livestock since 1998. Forest Service personnel noted that it was difficult for the Permittee to manage cattle in the western edge and northeast corner of the allotment. Forest Service personnel noted that conditions have improved since grazing stopped, but that the upland conditions are unknown at this time (C. Eppler, USFS, pers. comm. 2002).

Riparian Condition
- 5 percent Satisfactory
- 95 percent Unsatisfactory

Forest Service personnel noted that Pace Creek in the northeast corner of the Allotment is the most downcut on this allotment, with steep cut banks of 20 to 30 feet. Forest Service personnel noted that the system appears to have stabilized somewhat in the bottom, but that the banks are still raw. Those portions of Campbell Blue Creek on the Turkey Allotment were also described as "not good". Concerns with this area included use of the private land (not belonging to the Permittee) and its effects on this portion of Pace Creek, high road densities in the area, bare soils in the upland, Ponderosa pine community, and impacts on loach minnow located just downstream of the allotment (J. Ward, USFS, pers. comm. 2002).

The BAE notes that "The Campbell Blue Creek has been altered by many of the same factors as the Blue River, and is in a similarly degraded condition. Jackson and Pace creeks are primarily low-gradient alluvial stream channels that are severely altered from livestock grazing and activities occurring on private lands. These two stream channels have been downcut and widened 15 to 25 feet, and active headcutting (5 to 10 feet) and areas of eroding streambanks with no vegetation are common."

Bobcat-Johnson Allotment

Previous consultation was completed on this allotment, concluding on April 29, 1996. In that consultation, the Forest Service requested concurrence with a finding of "is not likely to adversely affect" for loach minnow. The May 4, 2002, letter from the FWS indicated that we did not concur with this determination for the Bobcat-Johnson Allotment.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Bobcat-Johnson Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." As discussed above the existing conditions of the

aquatic and riparian habitats within the allotment are highly degraded from past and ongoing management activities, and provide little or no buffering or filtering capability before entering the Blue River and Campbell Blue Creek." Additional details on Allotment conditions are as follows:

Elevation
- 5,900 to 8,300 feet above sea level

Major Vegetation Types
- Pinyon-juniper - 9,640 acres
- Ponderosa pine - 13,547 acres
- Mixed conifer - 1,064 acres
- Meadow and Riparian - 898 acres

Major Drainages

- Blue River, Campbell Blue Creek

Watershed Condition
- Within the following watershed(s):
  - Middle Blue 5th Code Watershed
- Within the Allotment:
  - 19,509 acres within the Middle Blue 5th Code Watershed constitute 20.3 percent of that watershed, and were expected to be within capacity in 1998.

Soil Conditions
- 28 percent Stable (Satisfactory)
- 4 percent Impaired (Unsatisfactory)
- 68 percent Unstable (Unsuited)

Range Condition - Largely unknown. Inspections were completed within the Castle Pasture in 2001. The Forest provided data indicating that use on spike muhly (*Muhlenbergia wrightii*) as of July 17, 2001, was at 15 percent, with grazed plants averaging 7.9 inches, and ungrazed plants averaging 12.4 inches.

Forest Service personnel did note that the Permittee waived back grazing privileges for the Muddy Pasture on the Bobcat-Johnson, so that this area is no longer used. They noted that this is a smaller cattle operation, and that cattle are therefore easier to manage, with the result that cattle "rim out", or use all portions of the Allotment, rather than becoming concentrated in specific areas. The topography has assisted with this as well, in that it is generally less steep, with the exception of Johnson Canyon, than other neighboring allotments (C. Eppler, USFS, pers. comm. 2002).

Riparian Condition
- 34 percent Satisfactory Condition for all riparian areas on the Allotment
- 66 percent Unsatisfactory Condition for all riparian areas on the Allotment
- 15 percent Satisfactory Condition on the Blue River
- 85 percent Unsatisfactory Condition on the Blue River

The Bobcat-Johnson Allotment contains approximately 60 miles of intermittent and perennial rivers, including the Blue River and Campbell Blue Creek, which are both perennial. The Blue River corridor on the Bobcat-Johnson Allotment contains 405 acres of riparian vegetation.

Foote Creek Allotment

This allotment was included in the Regional Office consultation, 000089RO, in which the Forest Service made a may affect, likely to adversely affect determination for loach minnow and Mexican spotted owl. This allotment was subsequently consulted on, under 2-22-99-F-016 written in the New Mexico Ecological Services Field Office. The opinion concluded not likely to adversely affect for loach minnow, and the FWS concurred. Critical habitat was not addressed at that time.

Details on Allotment conditions are as follows:

Elevation
- 5,500 - 8,550 feet

Major Vegetation Types
- Mixed conifer - approximately 10,144 acres
- Ponderosa Pine - approximately 7,175 acres
- Pinyon-juniper approximately 4,701 acres
- Grassland - approximately 742 acres
- Aspen - approximately 742 acres
- Spruce Fir - approximately 742 acres
- Riparian Hardwood - approximately 247 acres

Major Drainages
- Hannagan Creek, Foote Creek

Watershed Condition
- Overall Watershed Condition - No details provided.
- Within the Allotment - No details provided.

Soil Conditions
- 70 percent Stable (Satisfactory)
- 29 percent Impaired (Unsatisfactory)

- 1 percent Unstable (Unsuited)

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	263	2
Fair	692	5
Poor	4,248	29
Very Poor	9,316	64

Range inspection reports indicate that, in March of 2000, use of mountain-mahogany was at 70 to 90 percent, based on a stem-count method. Other range inspections using the gauge method found 39 percent use on spike muhly in October 2000. September through October 2001 assessments were conducted in the Willow Creek, Taylor, and West Thomas pastures, finding use on a variety of species ranging between 0 to 14 percent, however, this occurred before livestock entered the pastures.

Forest Service personnel noted that there are combined effects from grazing and shallow soil conditions, resulting in shrubs with stunted growth forms that are subsequently "hedged" due to grazing. Big horn sheep also use this allotment heavily. Personnel noted that the drainages are in better condition than the uplands (C. Eppler and J. Ward, USFS, pers. comm. 2002).

Riparian Condition - No data provided. The information provided indicates that portions of Foote Creek are at PFC, while other portions are functioning-at-risk or non-functional.

Red Hill Allotment

This allotment was consulted on previously under 000089RO in the Regional Office of the FWS. The Forest Service determined that the proposed action was likely to adversely affect loach minnow. The allotment underwent subsequent consultation under 2-22-99-F-016, which was written in the New Mexico Ecological Services Field Office. The Forest Service determined that the proposed action under consultation at that time was not likely to adversely affect loach minnow, and the FWS concurred. Critical habitat was not addressed at that time.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Red Hill Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." Additional allotment condition details are as follows:

Elevation

- 6,000 - 7,700 feet

Major Vegetation Types
- Pinyon-Juniper - 84 percent
- Ponderosa Pine - 11 percent
- Riparian hardwood - 3 percent
- Private - 2 percent

Major Drainages
- Tutt Creek, Bush Creek, Blue River

Watershed Condition
- Within the Allotment:
  - 6,331 acres within the Middle Blue 5th Code Watershed.
  - 1,117 acres within the Upper Blue 5th Code Watershed.
  - 419 acres in Satisfactory Watershed Condition
  - 749 acres in Unsatisfactory Watershed Condition
  - 6,262 acres in Satisfactory/Untreatable Condition

The EA notes that approximately 90 percent of the watershed within the Red Hill Allotment is in satisfactory condition, while 10 percent is rated impaired or unsatisfactory.

Soil Conditions
- 94 percent Stable/Satisfactory
- 6 percent Impaired/Unsatisfactory
- 0 percent Unstable/Unsuited

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	0	0
Fair	67	1
Poor	1,364	18
Very Poor	5,967	81

With respect to range condition, the BA for the on-going grazing consultation notes that the past management practice of year-long grazing has resulted in reductions in cool season grasses. The Allotment, which is characterized as browse range, has experienced "heavy past and present use", and hedging, lack of age class diversity and few seedlings for recruitment "raises concern for the long-term viability of the shrub component that is currently supplying a major portion of the cattle dietary requirement (~50 percent)."

Forest Service personnel noted that, in the upland portions of the Allotment, there is a lot of bare ground. There are major bluff systems, or "badlands" with very loose soils, which experience raindrop and sheet erosion. The bare ground is due to the geology of the area, but still results in higher sedimentation levels. However, cattle tend to avoid these areas within the Allotment (C. Eppler, USFS, pers. comm. 2002).

The EA notes that allowable forage utilization levels are within Forest Service guidelines when livestock alone are considered, but are not within guidelines when livestock and wild ungulates are considered. The Forest Service completed rangeland management monitoring and compliance in 2000 and 2001 for the Red Hill Allotment. Monitoring and compliance found utilization rates ranging widely, from 0 to 90 percent on various species using various methods (i.e., ocular, stem count, etc.).

Riparian Condition

The Red Hill and Bush Creek allotments jointly contain approximately 18 miles of perennial and intermittent streams. The Blue River is a perennial stream within these allotments. Other named perennial and intermittent drainages include Bush Creek, Cedar Spring Canyon, Dam Canyon, Foote Creek, Johnson Canyon, Steeple Canyon, and Tutt Creek. Most of these streams enter the Blue River within the allotments, with a few entering the Blue River downstream of the allotments. There are approximately three miles of unnamed drainages within the allotment that flow directly into the Blue River within the allotments.

No specific information provided. The EA notes that uppermost Foote Creek is in PFC, while lower Foote Creek is Functional-at-Risk with a downward trend. Tutt and Bush Creeks are believed to be in similar condition. The EA notes that woody species on the lower reaches of Foote Creek, Tutt Creek and Bush Creek are in poor condition due to heavy use (65 percent+) each spring, March through May. The EA also notes that age class distribution of willows is poor, with few mature plants present, and little regeneration. Cottonwood and willow regeneration is occurring on the Blue River, but is expected to be removed through periodic flooding. Ecological conditions and/or management actions that contribute to the adverse effects are listed as 1) all pastures on the allotment allow livestock to concentrate within either Bush, Tutt, or Foote creek; and 2) degraded range conditions.

Per Forest Service staff, Tutt Creek within the Allotment is in poor condition, and experiences additional degradation with high flows. The substrate is cobble/boulder, and the channel is still

downcutting. Staff indicated that they have been aggressive in removing cattle from pastures when they get close to allowable use standards, and in keeping them out of pastures until the conditions are ready for grazing (C. Eppler, USFS, pers. comm. 2002).

Forest Service staff indicated that Bush Creek, within the Bush Creek Pasture, is wide, with more fines, gravels, and sands in the lower end. The upper portions of the Creek are narrower, with larger substrate and significant alder stands, however, the Creek becomes less stable as it progresses downstream. Staff indicated that Tutt Creek was in similar condition, with degradation increasing closer to its confluence with the Blue River. Tutt Creek is wide at its confluence with Bush Creek (C. Eppler, USFS, pers. comm. 2002).

Forest Service staff noted that Foote Creek within the Allotment "blows out when it rains" and is very wide at the Allotment boundary. Large alders are present in the upper quarter, with some immature willows present as well (C. Eppler, USFS, pers. comm. 2002).

Bush Creek Allotment

This allotment has undergone previous consultation as part of the on-going grazing opinion (000089RO). In that consultation, the Forest Service had determined that the proposed action was likely to adversely affect loach minnow.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Bush Creek Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." The BAE Addendum notes that degraded riparian and aquatic habitat conditions exist within the allotment as a result of past and ongoing management actions that caused reduced ground cover and other vegetative and physical alterations of upland and riparian conditions. Conditions on the Bush Creek Allotment are as follows:

Elevation
- 6,000 feet

Major Vegetation Types
- Pinyon-Juniper

Major Drainages
- Blue River, Bush Creek, Steeple Creek

Watershed Condition
- Overall Watershed Condition - No details provided.
- Within the Allotment - No details provided.

Soil Conditions

As outlined in the ongoing grazing opinion (000089RO), 1987 TES data indicated that most of the allotment is in impaired or unsatisfactory soil condition, while 1997 range condition data indicate very poor conditions, with soil stability rated as poor.

Range Condition

No specific measurements have been taken across the Allotment, but range staff for the Forest Service have indicated that measurements taken at key areas indicate that conditions are poor for Full Capacity rangelands, with a downward trend (B. McKinney, USFS, pers. comm. 2002). Additionally, the Supplemental BA for the ongoing grazing consultation (000089RO) notes for the Bush Creek Allotment that range condition in the Mountain Pasture was rated as very poor with a downward trend in 1997.

Range inspections for this allotment, recorded in March 2000, indicate that conditions prior to livestock entering the allotment indicated a 0 to 5 percent use of grasses (*Bouteloua* sp.). November inspections completed prior to livestock entering the Allotment indicated 0 to 5 percent use of curly mesquite (*Hilaria belangeri*). These measurements were made using the ocular estimate method.

Riparian Condition

Range staff have indicated that five measurements were taken for riparian areas in Bush Creek, including composition, density, vigor, stand structure, and basal area, and all measurements indicate that riparian conditions are poor at this time (B. McKinney, USFS, pers. comm. 2002).

Fishhook-Steeple Mesa Allotments

Previous consultation was completed on this allotment, concluding on April 29, 1996. In that consultation, the Forest Service requested concurrence with a finding of "is not likely to adversely affect" for loach minnow. The FWS did not concur with this determination for the Fishhook-Steeple Mesa allotments. Other historical and ongoing factors that have influenced the existing conditions on the allotment are timber harvest and other vegetation management activities, fire suppression and management, recreation activities and management, and the roads and trails associated with all of these activities. The BAE notes that numerous activities associated with private lands along the Blue River have significantly altered the Blue River and its tributaries. The introduction and presence of nonnative aquatic species within, upstream, and downstream of the Allotment have also impacted the loach minnow and their critical habitat.

As noted in the general paragraph above, the May 15, 2001 Addendum to the BAE for the Fishhook-Steeple Mesa Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." The BAE Addendum further notes that "...the existing conditions of the aquatic and riparian habitats within the allotment are highly degraded from past and ongoing management activities, and provide little or no buffering or filtering capability before entering the Blue River." Additional details about Allotment conditions are as follows:

Elevation
- 5,000 - 9,200

Major Vegetation Types
- Pinyon-Juniper Woodland - 50 percent
- Mountain Brush - 35 percent
- Ponderosa Pine and Mixed Conifer - 15 percent
- Meadow and Riparian - 400 acres (2 percent)

Major Drainages
- Blue River, Fishhook Creek, Foote Creek

Watershed Condition
- Overall Watershed Condition: No details provided.
- Within the Allotment: No details provided.

Soil Conditions
- 19 percent Stable (Satisfactory)
- 25 percent Impaired (Unsatisfactory)
- 56 percent Unstable (Unsuited)

Range Condition - Unknown. An assessment of upland conditions is underway, but will not be completed within the timeframe of this biological opinion.

Riparian Condition
- 40 percent in Satisfactory Condition
- 60 percent in Unsatisfactory Condition

The BAE Addendum notes that the Fishhook-Steeple Mesa allotments contain approximately 63 miles of perennial and intermittent streams. The Blue River is the major perennial stream, and other named perennial and intermittent streams include Bear Canyon, Cedar Spring Canyon, Fishhook Creek, Foote Creek, Grant Creek, Horse Canyon, KP Creek, Largo Creek, McKittrick Creek, Moonshine Canyon, Panther Creek, Red Bull Canyon, Sawmill Canyon, Steeple Creek, Still Canyon, and Sweetie Canyon. According to the BAE Addendum, most of these streams enter the Blue River within the allotments, while the remainder enter the Blue River downstream of the allotments. Additionally, there are approximately eight miles of unnamed drainages that flow directly into the Blue River within the allotments.

A GAWS Level III Stream assessment was conducted in 1994. Information from that survey is summarized below.

Table 5. Stream Assessment results for the Fishhoook-Steeple Mesa Allotments.

Parameter	Reach 1 Avg. (6 Stations)	Reach 2 Avg. (6 Stations)	Reach 3 Avg. (3 Stations)	Reach 4 Avg. (4 Stations)	Overall Average
% Bank Cover	72.9	56.3	73.3	82.5	71.25
% Bank Stability	54.6	84.2	78.3	83.8	75.225
% Bank Vegetation Stability	55.8	77.5	76.7	86.3	74.075

Stream Channel Stability	50.5	47.5	44.0	41.8	45.95
Percent Embeddedness	47.8	32.1	17.8	11.7	27.35

Partial data for these same parameters as measured in a GAWS Level III Habitat Condition Index at Reach 4 in 1995 indicate average percent bank cover as 67.9, average bank stability as 67.1, and average bank vegetation stability as 69.3.

Cow Flat Allotment

The Cow Flat Allotment was consulted on previously under the ongoing grazing opinion (000089RO). During that consultation, a determination of "likely to adversely affect" was made by the Forest Service for loach minnow. The Allotment underwent consultation subsequently under 2-22-99-F-016, in which the Forest Service determined that the proposed action was not likely to adversely affect loach minnow, and would not effect spikedace.

As noted in the general paragraph above, the May 15, 2001, Addendum to the BAE for the Cow Flat Allotment notes that "The vegetative, physical, and biological characteristics of the entire Blue River have been severely altered by several factors." The BAE Addendum further notes that other historical and ongoing factors have influenced existing conditions on the Cow Flat Allotment, including timber harvest and other vegetation management activities, fire suppression and management, recreation activities and management, and the roads and trails associated with all of these activities. Numerous activities associated with private lands along the Blue River have significantly altered the Blue River and its tributaries as well. Finally, the introduction and presence of nonnative aquatic species within, upstream, and downstream of the allotment have also impacted loach minnow and critical habitat for spikedace and loach minnow.

Elevation
- 5,500 - 8,550 feet

Major Vegetation Types
- Ponderosa Pine - 62 percent
- Mixed Conifer - 21 percent
- Pinyon-juniper - 12 percent
- Oak Woodland - 2 percent
- Riparian Hardwood - 2 percent
- Private - 1 percent

Major Drainages

- Blue River, Foote Creek, Lanphier Canyon, Little Creek

Watershed Condition

- Overall Watershed Condition:

  The Cow Flat Allotment is within the Middle Blue River 5th Code Watershed, which is rated as satisfactory. However, the EA notes that "Although most of the watersheds are in satisfactory condition, there are localized areas of unsatisfactory condition in areas where ungulates concentrate, such as in meadow openings and along ephemeral and intermittent drainages. There is a large portion of Foote Creek and Cow Flat allotments in the "satisfactory/untreatable" class, which is assigned to the satisfactory watershed condition class. These lands are naturally unstable and are not economically treatable."

- Within the Allotment:
  - 6,746 acres in satisfactory condition
  - 7,733 acres in unsatisfactory condition
  - 6,999 acres satisfactory/untreatable

Soil Conditions

- 32 percent Stable (Satisfactory)
- 68 percent Impaired (Unsatisfactory)
- 0 percent Unstable (Unsuited)

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	0	0
Fair	5,847	26
Poor	7,841	34
Very Poor	9,047	40

Forest Service personnel indicated that cattle on this Allotment are well-dispersed, and that use levels in Lanphier Canyon are within guidelines. Cattle focus on browse species mountain-mahogany (*Cercocarpus montanus*) and scattered bunch grasses (bullgrass) due to the time of year at which they are grazing this allotment (C. Eppler, USFS, pers. comm. 2002). Forest Service personnel also noted that sediment transport to the stream must be occurring, and that they believe livestock exacerbate

conditions on the allotment, however, the decision to decrease cattle herds might be reversing this trend (J. Ward, USFS, pers. comm. 2002).

Monitoring data provided by the Forest Service indicated that the Cow Canyon Pasture is receiving less use than the prescribed allowable utilization standard, as of January 2000. Ocular measurements of Mountain-mahogany showed 10 percent use on the north side of Sawmill Canyon and 20 percent use on the south-facing slopes of Lanphier Peak (based on current year's grazed twig method). With respect to grasses, midpoint range inspections of the Lanphier Pasture indicated a 10-15 percent utilization on bullgrass (*Muhlenbergia emersleyi*) at one site and a 10-20 percent use on bullgrass at a second site, using an ocular method. A third assessment indicated 5 - 10 percent use on bullgrass within the Cow Canyon Pasture. During a June 1999 range inspection, the Forest Service observed use of 0 to 20 percent in Largo Canyon on sedges, Nodding brome (*Bromus anomalus*), muttongrass (*Poa fendleriana*), squirreltail (*Sitanion hystrix*), bullgrass, and Junegrass (*Koeleria cristata*). In upper Largo Canyon, usage increased to 30 percent, and in portions of section 10, bullgrass use was 80 percent in open, burned areas.

In the Sawmill Canyon area, Forest Service personnel noted during inspections that Buckbrush (*Ceanothus fendleri*) received less than 40 percent use by deer. There were isolated patches of use on *Carex* which approached 50 to 70 percent. Forest Service personnel concluded that utilization of forage in the Lanphier Pasture was low in most areas, but that due to a forage production of less than 50 pounds per acre of herbaceous vegetation, much of the pasture is in the No Capacity category for range.

These measurements indicate that use is well within established guidelines. However, a thorough analysis of overall range conditions would be needed to determine the overall condition of upland and riparian areas within the Allotment.

Riparian Condition

The Cow Flat Allotment contains 55 miles of perennial and intermittent streams. In addition to the Blue River, other perennial and intermittent drainages include Cow Canyon, Hinkle, Largo Canyon, Lanphier Canyon, Sawmill Canyon, and Sweetie Canyon. Most of these streams enter the Blue River within the allotment, with a few entering the Blue River downstream of the Allotment, according to the BAE Addendum. There are approximately six miles of unnamed drainages within the allotment that flow directly into the Blue River within the Allotment. As noted above under watershed conditions, there are localized areas of unsatisfactory condition where ungulates concentrate, such as in meadow openings and along ephemeral and intermittent drainages.

No specific information was provided as to the condition of riparian areas within the allotment. Forest Service personnel indicated that Largo Creek is intermittent, drying up to where only small pockets are left at times. These conditions exist for Indian Canyon and Whoa Canyon as well. Cow Canyon and

Hinkle Springs are both perennial (C. Eppler, USFS, pers. comm. 2002). Forest Service personnel also noted that lower end of tributaries to the Blue River are downcutting from their downstream end upwards due to lowering of the Blue River (J. Ward, USFS, pers. comm. 2002).

KP and Raspberry Allotments

Previous consultation was completed on this allotment, concluding on April 29, 1996. In that consultation, the Forest Service requested concurrence with a finding of "is not likely to adversely affect" for loach minnow. The FWS did not concur with this determination for the KP or Raspberry allotments. Additional consultation was completed for the Raspberry Allotment for reintroduction of Gila trout (*Onchorhynchus gilae*) in 2000, under 2-21-00-F-396.

According to the BAE Addendum, other historical and ongoing factors that have influenced the existing conditions on these allotments are timber harvest and other vegetation management activities, fire suppression and management, recreation activities and management, and the roads and trails associated with all of these activities. The BAE Addendum further notes that numerous activities associated with private lands along the Blue River and KP Creek have significantly altered the Blue River and its tributaries, and that the introduction and presence of nonnative aquatic species with, upstream, and downstream of the allotment have also impacted the loach minnow and their critical habitat. Additional details about the condition of these allotments is as follows:

KP Allotment

Elevation
- 5,100 - 9,400

Major Vegetation Types
- Pinyon-juniper - 4,690 acres
- Mountain Brush - 1,950 acres
- Ponderosa Pine - 8,800 acres
- Mixed conifer 10,100 acres
- Aspen - 2,040 acres
- Riparian - 115 acres
- Wet Meadows - 60 acres

Major Drainages
- KP Creek, Raspberry Creek, Blue River

Watershed Condition

The KP Allotment falls within the Middle Blue River, Eagle Creek, and Lower Black River 5th Code watersheds. The Forest Service has indicated that these watersheds are overall in satisfactory condition. No specific information on the condition of the watershed within the allotment boundaries was provided.

Soil Conditions
- 56 percent Stable (Satisfactory)
- 20 percent Impaired (Unsatisfactory)
- 24 percent Unstable (Unsuited)

Range Condition - Unknown. The KP Allotment was scheduled for non-use by livestock in 2000, 2001, and 2002; therefore, no recent range inspections have been conducted.

Riparian Condition
- 25 percent Satisfactory Condition
- 75 percent Unsatisfactory Condition

For the KP Allotment, six drainages were identified as supporting riparian areas totaling 35.6 miles. These included KP Creek, Bear Wallow Creek, South Fork of Bear Wallow Creek, North Fork of Bear Wallow Creek, McKittrick Creek, and Grapevine Canyon. The EA notes that the unsatisfactory condition of 75 percent of these areas may be attributable to the combined effects of weather, soils, ungulate grazing, and past management activities.

Raspberry Allotment

Elevation
- 4,800 - 7,100

Major Vegetation Types
- Pinyon-juniper - 12,400 acres
- Mountain Brush - 1,000 acres
- Ponderosa Pine - 240 acres
- Riparian - 425 acres

Major Drainages
- Blue River, Strayhorse and Raspberry Creeks

Watershed Condition

The Raspberry Allotment falls within the Middle Blue River, Eagle Creek, and Lower Black River 5th Code watersheds. The Forest Service has indicated that these watersheds are overall in satisfactory

condition. No specific information on the condition of the watershed within the allotment boundaries was provided.

Soil Conditions
- 3 percent Stable (Satisfactory)
- 3 percent Impaired (Unsatisfactory)
- 94 percent Unstable (Unsuited)

Range Condition - Unknown. The Raspberry Allotment was scheduled for non-use in 2000, 2001, and 2002, therefore, no recent range inspections have been completed.

Riparian Condition
- 10 percent Satisfactory Condition
- 90 percent Unsatisfactory Condition

For the Raspberry Allotment, there are 13.3 miles of riparian areas along Strayhorse Creek, the Blue River, Raspberry Creek, and Beeler Creek. The EA concludes that the unsatisfactory condition of 90 percent of these areas is due to the combined effects of weather, soils, ungulate grazing, and past management as well, per the EA. The EA further notes that it is the opinion of Alpine District personnel that 100 percent of the Blue River is in unsatisfactory condition.

Pigeon Allotment

This Allotment was consulted on previously within the ongoing grazing opinion (000089RO). Details on condition of the Pigeon Allotment are as follows:

Elevation
- 3,800 - 6,700 feet

Major Vegetation Types
- Juniper Savannah Disclimax - 6,124 acres (18.9 percent)
- Open Pinyon-Juniper Savannah - 2,008 acres (6.2 percent)
- Woodland - 12,261 acres (37.8 percent)
- Browse - 11,631 acres (35.8 percent)
- Riparian - 198 acres (0.6 percent)
- Ponderosa Pine - 141 acres (0.4 percent)
- Private - 110 acres (0.3 percent)

Major Drainages
- Blue River, Pigeon Creek, Turkey Creek, HL Creek

Watershed Condition

- Overall Watershed Condition:
  - Lower Blue 5th Code Watershed - Optimum Watershed
  - Lower San Francisco 5th Code Watershed - Satisfactory Watershed
- Within the Allotment:
  - 28,963 acres, or 31 percent of the Lower Blue River 5th Code Watershed
  - 3,511 acres, or 2 percent of the Lower San Francisco 5th Code Watershed

No specific information on watershed conditions within the Allotment were provided. The Consultation Forms note that cumulative effects do occur in the San Francisco 4th Code Watershed in both Arizona and New Mexico, and that loach minnow are distributed in much of this area. The aquatic habitats in the San Francisco and Gila rivers are described as impacted by agriculture, urban, and industrial activities within 25 miles downstream of the allotment.

Soil Conditions

- 13 percent Satisfactory
- 22 percent Impaired
- 3 percent Unsatisfactory
- 62 percent Unstable

The Consultation Forms note that "Soils within the allotment are typically not functioning properly and normally. Soil function apparently is being sustained on only about 13 percent of the soils on the allotment. Of the remaining 87 percent of the allotment, almost two-thirds of the allotment (62 percent) includes soils that are inherently unstable and/or unstable due to past human-related activities." The Consultation Forms conclude that "Based largely on soil conditions, livestock grazing is incompatible (i.e., "No Capability") on almost half (45 percent) of the allotment."

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	0	0
Fair	6,257	52
Poor	3,103	26
Very Poor	2,720	22

Monitoring forms submitted by the Forest Service indicate that inspections on overall utilization for the Pigeon Pasture appears very light, at 0 to 5 percent in most areas, and 20 to 25 percent in riparian areas. The Consultation Forms note that, while some annual or seasonal rest occurs, it is insufficient to improve rangeland health.

The Forest Service notes that the Pigeon Allotment was stocked at 38% in 2001 and 2002, with 181 cow/calf units and 11 horses. This is a temporary modification of the proposed action.

Riparian Condition

Total riparian acres within the allotment is 198. Seven miles of riparian areas are excluded from grazing. The perennial streams within or adjacent to the allotment include the Blue River, and Turkey, Pigeon, and HL creeks. A PFC Assessment was completed within the Allotment. The first reach was the Lower Blue River Reach 1, extending from its mouth to 475C, approximately 8.2 miles. A small portion of this reach forms the northern and southern portions of the Allotment's eastern boundary.This reach was rated as functional-at-risk with an upward trend. The data sheets from this analysis are in the Consultation Forms provided for this project, and are incorporated herein by reference. The data sheets note that the positive aspects of the condition of the riparian areas in this reach include that the floodplain is inundated in "relatively frequent" events; the riparian zone is widening or has achieved potential extent; there is a diverse (i.e., two or more) composition of vegetation; streambank vegetation is beneficial in preventing bank erosion; point bars are revegetating; and the system is vertically stable.

The data sheets note that the negative aspects of the riparian condition in this reach include that the channel is too shallow and wide; there is a lack of fine deposition; vegetation is sparse; the channel is shifting from side to side; there is poor floodplain development; and there is a lack of age-class diversity in riparian vegetation species. Further, the data sheets note that the upland watershed conditions are contributing to riparian degradation, and that the stream is not in balance with the water and sediment being supplied by the watershed.

The PFC Assessment notes that factors outside of the Forest Service's control that are affecting or have affected riparian conditions include flow regulations, channelization, diking of private lands upstream which increases velocity, reduction of floodplain development potential, grazing on private lands, and upstream channel conditions.

A compliance inspection report, dated 12/11/2000, notes that, within the HL/Spring Canyon pasture on the east side of Pigeon Pasture, "Higher utilization levels occur in the drainage bottoms and the slopes that are near riparian areas with levels being as high as >50 percent and tapering off to 20-30 percent on the upper portions of the ridge." Utilization throughout the pasture measured approximately 29 percent, with use along the HL/Spring Canyon ridge estimated at 20 percent. Similarly, the report notes that the Pigeon Pasture showed levels of use between 15 - 30 percent along the Buck Park trail, which increased significantly to up to 70 percent along the riparian corridor.

Wildbunch Allotment

This Allotment was consulted on previously within the 2000 ongoing grazing opinion (000089RO). That opinion determined that the proposed action would not adversely affect spikedace, but was likely to adversely affect loach minnow, and peregrine falcon. The decision on spikedace was overturned in court (*Center for Biological Diversity v. U.S. Forest Service, 97-666 TUC JMR*).

Details on condition of the Wildbunch Allotment are as follows:

Elevation
- 4,500 - 8,000 feet

Major Vegetation Types
- Browse - 11,675 acres (50.6 percent)
- Open Pinyon-Juniper Savannah - 1,937 acres (8.4 percent)
- Woodland - 3,675 acres (15.9 percent)
- Juniper Savannah Disclimax - 5,441 acres (23.6 percent)
- Riparian - 297 acres (1.3 percent)
- Ponderosa Pine - 30 acres (0.1 percent)
- Private Land - 15 acres (0.1 percent)

Major Drainages
- San Francisco River

Watershed Condition
- Overall Watershed Condition:
  - Lower Blue River 5th Code Watershed - Optimum
  - Lower San Francisco 5th Code Watershed - Satisfactory

- Within the Allotment:
  - 15,789 Acres in the Lower Blue River 5th Code Watershed
    - 11,514 (73 percent) in satisfactory condition
    - 4,275 (27 percent in unsatisfactory condition
  - 7,281 Acres in the Lower San Francisco 5th Code Watershed
    - 2,122 acres (29 percent) in satisfactory condition
    - 5,159 acres (71 percent) in unsatisfactory condition

Soil Conditions
- 24 percent Satisfactory
- 10 percent Impaired
- 2 percent Unsatisfactory

- 64 percent Untreatable

The Consultation Forms provided by the Forest Service indicate that "Soils within the allotment are typically not functioning properly and normally. Soil function is being sustained on about 23 percent of the soils on the allotment. Of the remaining 77 percent of the allotment, almost two-thirds of the allotment (64 percent) includes soils that are inherently unstable and/or unstable due to past human-related activities. Inherently unstable soils exhibit "natural erosion levels that exceed tolerances and are considered untreatable with respect to livestock grazing...The remaining 13 percent of the soils on the allotment exhibit a reduction or loss of soil function to the extent that the ability of the soils to function properly has been reduced and/or there exists an increased vulnerability to degradation. These soils are candidates for improved management practices, or other preventative actions may be appropriate." The Consultation Forms further noted that, "Based on soils conditions, livestock grazing is incompatible (i.e., "No Capability") on about 41 percent of the allotment."

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	607	8
Fair	5,917	78
Poor	854	11
Very Poor	237	3

An additional 15,455 acres are classified as "no condition" within the Consultation Forms.

The Forest Service notes that the Wildbunch Allotment was stocked at 65%, or 225 cow/calf units at eight horses for 2001 and 2002. This is a temporary modification of the proposed action.

Riparian Condition

The Consultation Forms for the Wildbunch Allotment summarize riparian conditions along perennial drainages within the Allotment as follows:

PFC Category	Watercourse	Miles	Percent
Proper Functioning Condition	Cienega Creek	.125	4

	Wildbunch Creek	.25	
Functioning-at-risk; upward trend	Blue River	7	87
	San Francisco River	1	
	Cienega Creek	.0625	
Non-functional	Cienega Creek	.125	9
	Wildbunch Creek	.5	
	Mud Springs	.25	
Total Miles Assessed		9.3125	

This Allotment is bordered by 14 miles of the Blue and San Francisco rivers. A PFC Assessment has not been completed for all portions of these streams. The data sheets completed by the Interdisciplinary Team performing the PFC Assessment are contained within the appendices of the Consultation Forms and are incorporated herein by reference. In summary, the ID Team found that the riparian floodplain is being inundated by relatively frequent events; the riparian zone is widening or has achieved potential extent; there is a diverse (two or more species) composition of riparian vegetation; streambank vegetation is comprised of those plants or communities that have root masses capable of withstanding high streamflow events; point bars are revegetating; and the system is vertically stable. Problems were generally noted to include that the upland watershed is contributing to riparian degradation; vegetation present is inadequate to protect banks and dissipate energy during high flows; and the stream is not in balance with the water and sediment being supplied by the watershed.

Photographic documentation provided by the Forest Service indicates that there are localized areas experiencing regeneration of vegetation. One such area is at the Forest Road 475 crossing, where cottonwood trees are regenerating. Sediment deposition also appears to be occurring in this area.

A compliance inspection report dated January 12, 2001 notes that herbaceous utilization was >50 percent with browse use also being high throughout portions of Cienega Creek in the South Pasture. Oak Springs Canyon, within the Roan Cow Pasture, was described as being used mainly in the drainage bottoms, with utilizations ranging between 35 to 60 percent. Notifications have been made to the Permittees regarding the presence of unauthorized cattle in the Blue River. There are additional violation notices within the file and incorporated herein by reference. The Consultation Forms note that administrative action has been implemented on this allotment and that the next violation of permit conditions will result in cancellation of the permit. The Forest Service notes that the permittee has complied with the terms of the suspension and reconciliation they issued (F. Hayes, pers. comm. 2003).

Sardine Allotment

This Allotment was consulted on previously within the 2000 ongoing grazing opinion (000089RO). That opinion determined that the proposed action would not adversely affect spikedace. This decision was overturned in court (*Center for Biological Diversity v. U.S. Forest Service, 97-666 TUC JMR*). The Forest Service also determined in this consultation that the proposed action may affect but was not likely to adversely affect Arizona hedgehog cactus.

The Consultation Forms indicate that "The allotment is rated generally in Poor condition with static (apparent) trend. Based on observations, rather than measured data, it appears that composition and density of forage species may not be improving dramatically due to the stocking rate and management system. In addition, the soils and topography inhibits the productive potential of the allotment due to soil depth and physical properties." The Forest Service notes that administrative actions against a previous permittee resulted in complete destocking of the allotment between 1989 and 1994. A new permittee subsequently stocked with 10 head of livestock, restocking to 35 head following range improvements. This use level occurred for two years, with personal de-stocking in 1999 and non-use in 2001 and 2002. The Forest Service notes that the allotment remains in poor to fair conditions, with a trend in soil and watershed conditions up, including the intermittent riparian corridor in Sardine Canyon (F. Hayes, pers. comm. 2003). Additional details on Allotment conditions are as follows:

Elevation
- 4,000 - 6,700 feet

Major Vegetation Types
- Browse - 4,375 acres
- Pinyon-Juniper - 1,382 acres
- Grasslands - 1,120 acres
- Riparian - 1 Acre

Major Drainages
- San Francisco River

Watershed Condition
- Overall Watershed Condition:
  - 99.5 percent of the Allotment is in the San Francisco River 5th Code Watershed, which is rated as satisfactory.
  - 0.5 percent of the Allotment is in the Lower Blue 5th Code Watershed, which is rated as satisfactory.
- Within the Allotment:
  - Lower San Francisco River 5th Code Watershed:
    - 1 Acre Satisfactory

    - 5,484 Acres Satisfactory/Untreatable
    - 1,363 Acres Untreatable
- Lower Blue River 5th Code Watershed
    - 0 Acres Satisfactory
    - 14 Acres Satisfactory/Untreatable
    - 19 Acres Untreatable

Soil Conditions
- 0.2 percent Satisfactory
- 19.8 percent Impaired
- 80 Unsatisfactory

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	0	0
Fair	382	28
Poor	999	72
Very Poor	0	0

The Consultation Forms included specific conditions by pasture. For the Upper Sardine, Woods Canyon, and Santa Cruz pastures, the range condition and trend are listed as poor and static, with the pastures containing steep slopes, shallow soils, lack of ground cover, and limited full capacity range that tends to concentrate grazing on sensitive and highly erodible soils. Only 15 acres out of the total 6,879 acres contained in the Allotment are rated as full capacity for grazing.

The Lopez Pasture is described as being in similar condition. The Consultation Forms note that the grazing period extends through the entire growing season and does not allow for plant recovery after grazing.

The Forest Service notes that the Sardine Allotment has been in a temporary non-use status since 2000.

Riparian Condition

No information was provided. Sardine Creek has approximately 1.0 miles of perennial waters within the Allotment, with the upper 0.5 miles excluded from grazing by natural barriers. The San Francisco River is also excluded from grazing by natural barriers.

Hickey Allotment

This Allotment was consulted on previously within the 2000 ongoing grazing opinion (000089RO). That opinion determined that the proposed action would not adversely affect spikedace. This decision was overturned in court (*Center for Biological Diversity v. U.S. Forest Service, 97-666 TUC JMR*). The Forest Service also determined in this consultation that the proposed action may affect but was unlikely to adversely affect Arizona hedgehog cactus.

The Consultation Forms note that "The allotment is rated in Fair condition with a static to slightly upward (apparent) trend. Based on observations, rather than measured data, it appears that composition and density of forage species is favorable and in progress toward improving range condition." Figure 16 in Appendix B provides a map of the Allotment. Specific details on Allotment conditions are as follows:

Elevation
- 4,000 to 7,000 feet

Major Vegetation Types
- Browse - 13,412 acres
- Grasslands - 6,668 acres
- Pinyon-Juniper - 3,347 acres
- Riparian - 310 acres

Major Drainages
- Blue and San Francisco rivers

Watershed Condition
- Overall Watershed Condition:
  - Lower Blue 6th Code Watershed - Optimum Condition
  - Lower San Francisco 6th Code Watershed - Satisfactory Condition
  - Middle Gila 6th Code Watershed - Satisfactory
- Within the Allotment:
  - Comprises 11 percent of the Lower San Francisco 5th Code Watershed, with 24,161 acres in that watershed. OF those acres, 793 acres, or 3 percent, are in satisfactory condition, 13,629 acres, or 56 percent, are in unsatisfactory condition. The remaining acreage is untreatable.
  - Encompasses 3 acres of the Lower Blue 5th Code Watershed, with 2.5 acres, or 83 percent, satisfactory, and 0.5 acres, or 17 percent unsatisfactory.

- Includes 63 acres from the Middle Gila 6th Code Watershed, with 0 acres, or 0 percent, satisfactory, 50 acres, or 79 percent, unsatisfactory, and 13 acres untreatable.

Soil Conditions
- 12 percent Satisfactory
- 48 percent Impaired
- 40 percent Unsatisfactory

Range Condition

Condition Class	Acres	Percent of Allotment
Excellent	0	0
Good	158	1
Fair	11,329	83
Poor	2,094	15
Very Poor	0	0

Range inspection reports from August 2001 in the Hamilton Pasture determined utilization to be at 0 to 10 percent, and noted that the range was in good condition. Use within the Little Hickey Pasture during this inspection was rated as 0 percent, with range in good condition. Range inspection reports from October 2001 indicate that, within the Hamilton Pasture, allowable use was 30 to 35 percent, and actual use ranged from 0 to 40 percent, with only one site reaching 40 percent. Comments on overall pasture utilization indicate that distribution of livestock was poor during the growing season. Range inspections for January 2002 for the Silver Basin and Little Hickey pastures noted that allowable use was 35 to 45 percent, and actual use was 0 to 5 percent. Comments on overall pasture utilization noted that livestock use was light in both pastures, but that the Permittee noted that cattle had drifted from these pastures to the Hamilton Pasture when the gate was left open by recreationists. No information was provided for the remaining pastures (Hickey, Sunset, and Rattle Snake Gap, and the Bird Trap, RU Trap, and Hickey Trap pastures). Hickey, Sunset, and Rattlesnake Gap are scheduled for non-use, while Bird Trap, RU Trap, and Hickey Trap are unavailable for livestock use at thist ime.

Riparian Condition

The Consultation Forms note that riparian vegetation is primarily found along the San Francisco River corridor, which has been excluded from grazing since 1994. There are 310 total riparian acres, associated with 12.5 miles of perennial streams, as well as an unspecified number of ephemeral

drainages. The 12.5 miles of perennial streams are excluded from grazing, with bi-weekly monitoring required.

The Consultation Forms summarize riparian conditions as follows:

PFC Category	Watercourse	Miles	Percent
Functioning-at-risk; upward trend	San Francisco River	6	52
	Blue River	.5	
Non-functional	San Francisco River	6	48
Total Miles Assessed		12.5	

It should be noted that these 12.5 miles of the Blue and San Francisco rivers have been excluded from cattle grazing by the Forest Service.

The PFC Assessment was conducted along five reaches on the Blue and San Francisco rivers. The first reach is approximately 2.0 miles from the Forest Service Boundary to Lopez Spring on the San Francisco River. Reach 2 on the San Francisco River is 4.7 miles long extending from Lopez Spring upstream to the junction with Burro Mesa. Reach 3 is one mile long, from Martinez Ranch to Harden Cienega on the San Francisco River. Reach 4 is 0.5 miles long on the San Francisco River, from Martinez Ranch to the Hickey Allotment boundary. (Reaches 3 and 4 are upstream of the Hickey Allotment, within the Pleasant Valley Allotment). Reach 5 is 8.2 miles long on the Blue River, from its mouth to FR475C.

In summarized PFC ratings, all reaches achieved a "yes" rating for several of the 17 criteria, indicating that for all reaches, the floodplain is inundated in "relatively frequent" (i.e., 1 - 3 year) events; the riparian zone is widening or has achieved potential extent; a diverse composition of vegetation (i.e., 2+ species) is present (for maintenance/recovery); species present indicate maintenance of riparian soil moisture characteristics; streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events; riparian plants exhibit high vigor; point bars are revegetating; lateral stream movement is associated with natural sinuosity; and the system is vertically stable.

All reaches achieved a "no" rating for criterion 11, indicating that adequate vegetative cover is not present to protect banks and dissipate energy during high flows. Field notes indicate that for Reach 1, more terrace area is needed, and for Reach 1 and 5, that more floodplain vegetation of larger sizes is needed. Notes for Reach 2 indicate that vegetation is restricted to a strip of young trees. Reach 3 data indicate that bank cover is sparse above bankfull. Reach 4 data indicate that there is not enough vegetation.

Additionally, all reaches achieved a "no" rating for criterion 5, indicating that the upland watershed is contributing to riparian degradation. (Reach 1 received a yes/no rating for this criterion, with comments indicating that upland watershed conditions outside of the action area in New Mexico are contributing to riparian degradation, while those of the immediate surrounding canyon are not). These conditions also apply for Reach 2. Additionally, notes for Reach 2 indicate that there is some on-site degradation due to agricultural fields. Comments for Reach 3 indicate that the Gila National Forest and associated watershed are very degraded. Notes for Reach 4 indicate that problem areas include past grazing, irrigation, agriculture, and roads. Notes for Reach 5 indicate that the Alpine watershed is in poor condition, and that the Gila National Forest needs "great improvement". Roads, timbering, grazing, burns, and management on private lands in New Mexico are all cited as concerns.

Three of the five reaches achieved a "no" rating for criterion 6, indicating a lack of a diverse age-class distribution of riparian vegetation. Field notes indicate that there are a few mid-aged, a few remnant mature, and good regeneration of riparian vegetation in Reach 1. Notes for Reach 2 indicates indicate that there are lare numbers of immature trees, with a few larger cottonwoods and willows. Notes for Reach 3 indicate that the middle age-class is lacking, as do notes for Reach 4. Notes for Reach 6 indicate that there are mostly seedlings and saplings.

Three of the five reaches indicate that plant communities in the riparian area are not an adequate source of coarse and/or large woody debris. The remaining two reaches (3 and 4) indicate that this criterion is not applicable to them. Field notes for Reach 1 indicate that, as a canyon reach, large woody debris is not needed. Field notes for Reach 2 indicate that there are not enough larger or mature trees to contribute to woody debris. Field notes for Reach 5 indicate that there is no source of large trees, but that woody debris is not critical for this reach.

Four of the five reaches achieved a "no" rating for criterion 13, indicating that floodplain and channel characteristics are not adequate to dissipate energy. For Reach 1, field notes indicate that vegetation is generally in the two to three year up to seven years age group, which flattens during flooding. Reach 2 indicates that more sinuosity is needed, as well as better floodplain development. Notes for Reach 4 indicate that floodplain and channel characteristics are insufficient to deal with large events. Notes for Reach 5 indicate that the channel is "blown out canyon wall to canyon wall".

Three of the five reaches achieved a "no" rating for criterion 17, indicating that the stream is not in balance with the water and sediment being supplied by the watershed. A fourth reach, Reach 1, achieved a "yes/no" rating. Reach 3 achieved a "yes" rating for this criterion. Field notes for Reach 1 indicate that the channel is still cutting more than it is depositing, and that the upland watershed "must be contributing to hydrograph." Reach 2 notes indicate that there is not enough deposition of fines, with no vegetation band strong enough to slow flows, and that sinuosity is lacking. Reach 4 notes indicate that bankfull flow is balanced, but large events are not. Reach 5 indicates that there is a lack of fines deposition.

The ratings for criterion 3 are evenly divided, with two "yes" ratings, two "no" ratings, and one "yes/no" rating. Criterion 3 evaluates whether sinuosity, width/depth ratio, and gradient are in balance with the landscape setting. Notes for Reach 1, which received the "yes/no" rating, indicate that sinuosity is fine, but width/depth ratio is still too wide. Notes for Reach 2 indicate that both sinuosity and width/depth ratio are out of balance with the landscape setting. Notes for Reach 5 indicate that the sinuosity is canyon confined, and that the width/depth ratio is too shallow and wide. Reaches 3 and 4 achieved "yes" ratings.

The field notes compiled by the Interdisciplinary Team completing the PFC assessment indicate that perceived problems are varied. For Reach 1, the notes indicate that the upper watersheds are contributing greatly to instability, and that this is exacerbated by the road in the channel bottom. There is a lack of hydraulic roughness, which results in insufficient fines deposition in the floodplains, and floodplain development is lacking or very slow. Factors outside of the Forest Service's ability to control that are also affecting the channel include flow regulations, channelization, and irrigation on private lands in New Mexico which alter base flows. Notes for Reach 4 indicate that the ID Team has the same concerns as those listed for Reach 1.

For Reach 2, perceived problems are a lack of area for fine deposition, velocities of water from upland watersheds which are too powerful to deposit fines in the riparian zone, a lack of mid- and mature-age vegetation classes, an unstable channel, and impacts from private land management. Some of these impacts include road encroachment, irrigation take offs, and upland conditions on private lands in New Mexico.

Notes for Reach 3 indicate that the upper watershed, agricultural lands, and historic and current grazing upstream of the Clifton Ranger District all contribute to riparian condition in this reach. Additionally, factors outside of the action area and outside of the Forest Service's control are identified as agricultural lands, New Mexico watershed conditions, and upstream channel conditions.

Notes for Reach 5 indicate that the channel is too wide and shallow, there are few fines depositing, vegetation is sparse, and the channel appears to be shifting side to side. Poor floodplain development is impacting vegetation, including its age class distribution, which is predominantly young. The lack of floodplain development is perceived to be an indicator of problems in the watershed that allow water to concentrate and run off faster than it did historically. The notes indicate that all side drainages are incised as well. Factors outside of the Forest Service's control that are contributing to problems include flow regulations, channelization, diking of private lands, and upstream channel conditions.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger

action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Analysis of the effects of livestock grazing on fish and wildlife species and their habitats requires looking at long-term, incremental changes in watershed functions, riparian and aquatic communities, and stream channel morphology. Extrapolations of general hydrologic and biologic principles and site-specific research data provide a large body of evidence linking degradation of watersheds, stream channels, aquatic and riparian communities, and fish habitat and populations in western North America to past grazing and grazing management (Leopold 1924b, Leopold 1951, York and Dick-Preddie 1969, Hastings and Turner 1980, Dobyns 1981, Kauffman and Krueger 1984, Skovlin 1984, Kinch 1989, Chaney *et al*. 1990, Platts 1990, Armour *et al.* 1991, Bahre 1991, Meehan 1991, Fleischner 1994).

It is unlikely that any grazing scheme will improve a local hydrologic circumstance over that found under ungrazed conditions (Platts 1990, Belsky *et al*. 1999). Platts (1990) indicates that the two primary reasons why grazing strategies of any type have not protected riverine-riparian systems in the past is because streamside areas are generally incorporated into the larger pastures and not identified as distinct areas needing specialized management, and because the range is generally overstocked.

The effects of proposed livestock grazing and management to Upper Campbell Blue Creek, the Blue River, and the San Francisco River, as well as to perennial and intermittent streams and upland portions of the 16 allotments would occur through four mechanisms: 1) watershed alteration; 2) alteration of the riparian vegetation community; 3) alteration of the faunal community; and 4) effects from non-grazing and structural elements. These mechanisms have varying effects on the species covered by this consultation. Additionally, there is the potential for physical destruction and alteration of streambanks, stream channels, and water column on the mainstem due to indirect effects and on all of the tributaries, which are accessible to livestock.

Watershed Alteration

Livestock grazing may cause long-term changes to the watershed and its functions. The extent of these changes to the watershed varies with watershed characteristics, grazing history, and cumulative effects from other human uses and natural watershed processes. Watershed changes due to grazing are more difficult to document than direct livestock impacts to the riparian and aquatic communities due to their long-term, incremental nature, the time lag and geographic distance between cause and effect, and numerous variables. Despite this, the relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Leopold 1946, Blackburn 1984, Skovlin 1984, Chaney *et al*. 1990, Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994, Myers and Swanson 1995). Sayre (2001) notes that the emphasis in livestock grazing should be on "managing for the whole," and that "What gets eaten by livestock is a function of numerous processes involving water, soils, decomposers, other plants, and so on." Similarly, Naiman (1992) also notes the connectivity of

the watershed with riverine and riparian conditions, indicating that water flows down through the watershed, "...integrating influences of natural and human disturbances within the catchment." Although watershed effects vary depending upon the number and type of livestock, the length and season of use, and the type of grazing management, the mechanisms remain the same and the effects vary only in extent of area and severity (Blackburn 1984, Johnson 1992).

Livestock grazing may alter the vegetative composition of the watershed (Savory 1988, Vallentine 1990, Popolizio *et al.* 1994). It may cause soil compaction and erosion, alter soil chemistry, and cause loss of cryptobiotic soil crusts (Harper and Marble 1988, Marrs *et al*. 1989, Orodho *et al.* 1990, Bahre 1991). Cumulatively, these alterations contribute to increased erosion and sediment input into streams (Johnson 1992, Weltz and Wood 1994). They also contribute to changes in infiltration and runoff patterns, thus increasing the volume of flood flows while decreasing their duration and decreasing the volume of low flows while increasing their duration (Brown *et al*. 1974, Gifford and Hawkins 1978, Johnson 1992). Groundwater levels may decline and surface flows may decrease or cease (Chaney *et al*. 1990, Elmore 1992).

A combination of grazing capacity, utilization, condition, and trend data are needed for sound range management decisions, noting that grazing capacity is dynamic and can show great fluctuations with climatic trend. While all of the allotments would be grazed under a deferred rotation system, the FWS has concluded that rest alone, as provided by this system, will be insufficient to mitigate the effects of past and potential current overuse, as supported by various authors (Holechek *et al*. 1998, Mueggler 1975, Platts, 1990, Trlica *et al*. 1977).

It should be noted that overutilization is not uncommon, even in areas with established utilization criteria. Galt *et al*. (2000) note that "Consistently, actual measured use has been 10 - 15 percent higher than the intended use. We attribute this to livestock trampling, wildlife consumption, and weathering." In desert rangelands, researchers recommend that range be stocked for around 30 - 35 percent use of average forage production, with some destocking in drought years (Holechek *et al*. 1999). While this number was developed for desert ranges, it is consistent with the findings of other researchers who indicate that a harvest coefficient of 35 percent is suitable for arid and semi-arid areas (Galt *et al*. 2000).

Within the proposed action area, documentation provided by the Forest Service indicates that overutilization can and does occur in some areas. On the Upper Campbell Blue Allotment, the Utilization Summary noted that utilization was as high as 65 percent in the Turkey Creek Pasture, and 80 percent in the West, Campbell, and Cienega pastures in some areas. Information provided for the Red Hill and Bush Creek allotments noted that woody species on the lower reaches of Foote Creek, Tutt Creek, and Bush Creek are in poor condition due to heavy use of 65 percent or higher each Spring. For the Pigeon Allotment, an allotment inspection report noted that higher utilization levels were occurring in the drainage bottoms and riparian areas with use levels being as high as >50 percent, and use in one holding pasture occurring at 50 to 60 percent. Use along the road between the cattleguard

and ranch headquarters was reported to be at a 80 to 90 percent level. While the majority of the areas on these allotments are grazed at lower levels, these examples point out that overutilization is likely to continue within the proposed action area.

The Sandrock Allotment on the Apache-Sitgreaves National Forest is located between the Raspberry and KP allotments on the Clifton Ranger District, and the Pigeon and Wildbunch allotments on the Clifton Ranger District. Grazing was suspended on the Sandrock Allotment in 1984 due to concerns over watershed conditions at that time; and therefore, is not included in this consultation. Few studies have been completed on conditions within the Allotment since that time, but range analysis data were gathered in 1961, 1968, 1993, and 1994. In summary, information for this allotment noted that, following suspension of grazing, the number of total hits on plants in the transects increased by 25% between 1961 and 1994. The amount of litter on the ground has increased by 62% since 1962, with a corresponding decrease in the amount of bare soil of 30% since 1961. According to the Forest Service personnel, this indicates a trend of increasing soil cover and stabilization of soils (Rising 2002). We expect this trend to continue with this proposed action.

Soil condition scores on the Sandrock Allotment generally increased since 1961. Using the Parker Method (i.e., scoring in very poor, poor, fair, good categories), the score in most cases has gone from a poor to a fair rating. Forest Service personnel concluded that "we have less sediment movement into the Blue River than we did in the 1960s." Forest Service personnel also note that riparian vegetation is abundant on the tributaries to the Blue River within the Sandrock Allotment, and that upland forage production has at least doubled on most sites (Rising 2002).

Aquatic and Riparian Habitats

The effects of livestock grazing on riparian and aquatic habitats have been well documented and discussed in recent years (Platts 1990, Fleischner 1994, Belsky *et al*. 1999). Potential effects can be categorized into upland/watershed effects, streambank effects, streamflow and channel effects, water column effects, and effects to riparian vegetation. Grazing in the uplands can reduce the roughness coefficient of watersheds, which in turn results in more surface runoff, soil erosion, and flooding, which have effects on the water column, as discussed below. Resulting changes to watercourses can include changes in the hydrograph such as decreased base flows, increased flood flows, and increased sediment (Gifford and Hawkins 1978, Kauffman and Krueger 1984, Chaney *et al*. 1990, Platts 1990, Fleischner 1994).

The potential effects of grazing on streambanks include the shearing or sloughing of streambank soils by either hoof or head action; elimination of streambank vegetation; erosion of streambanks following exposure to water, ice, or wind due to loss of vegetative cover; and an increased streambank angle which increases water width and decreases stream depth. In other areas, damage begins to occur almost immediately upon entry of the cattle onto the streambanks and use of riparian zones may be highest immediately following entry of cattle into a pasture (Platts and Nelson 1985, Goodman *et al*.

1989). Vegetation and streambank recovery from long rest periods may be lost within a short period following grazing reentry (Duff 1979). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being more vulnerable to damage (Marlow and Pogacnik 1985, Platts 1990).

Following streambank alteration, potential effects to the channel itself can include changes in channel morphology and altered sediment transport processes (Platts 1990). Within the stream itself, there can be changes to pools, riffles, runs, and the distribution of backwater areas, a reduction in cover for fishes, elevated water temperatures, changes in nutrient levels, and increased sedimentation (Platts 1990, Belsky *et al*. 1999).

Effects to riparian vegetation can include changes in plant species composition, such as a transition from brush to grass to forbs; a reduction of floodplain and streambank vegetation, including vegetation which overhangs banks or is found within the water column; decreases in plant vigor; alteration of plant growth form, such as lateral branching; changes in the timing and amount of organic energy leaving the riparian zone, and; elimination of riparian plant communities, which may occur as a result of lowering of the water table so that xeric plants replace riparian plants (Platts 1990, Fleischner 1994).

Livestock grazing has been almost entirely excluded from the Blue and San Francisco rivers; however, livestock will likely continue to directly alter streamside vegetation by trampling, rubbing, and grazing on herbaceous plants and browsing on shrubs within the perennial and intermittent drainages throughout these allotments. Impacts to vegetation can be classified as utilization of herbaceous vegetation, and utilization of woody vegetation. Use and removal of herbaceous vegetation leads to changes in species composition, species diversity, and biomass while use and removal of woody vegetation can lead to changes in foliage cover, structural height diversity, and stand reproduction. Livestock may also have indirect effects on riparian vegetation by compacting the soils and causing increased runoff and decreased water availability to plants, and by increasing soil temperatures which can lead to increased evaporation due to the removal of vegetation (Kauffman and Krueger 1984).

Changes to the water column within the stream itself can be many and varied. Water column alterations can be caused by changes in the magnitude and timing of organic and inorganic energy inputs to the stream; increases in fecal contamination; changes in water temperatures due to removal of vegetation; changes in water column morphology, including increases in stream width and decreases in stream depth, as well as reduction of stream shore water depth; changes in timing and magnitude of streamflow events from changes in watershed vegetative cover; and increases in stream temperature (Platts 1990, Fleischner 1994).

The effects of grazing in the uplands on riparian systems have been addressed above. To generate and maintain riparian habitat, a healthy watershed (uplands, tributaries, ranges, etc.) is a key component (Elmore and Kauffman 1994, Briggs 1996). Elmore and Kauffman (1994) note that "simply excluding the riparian area (from grazing) does not address the needs of upland vegetation or the overall condition

of the watershed. Unless a landscape-level approach is taken, important ecological linkages between the uplands and aquatic systems can not be restored and riparian recovery will be limited." Continuing to graze in uplands where the soil conditions and riparian habitat in upland tributaries are unsatisfactory will continue to delay recovery and result in unnatural flooding. The proposed action will result in a decrease in cattle use which may improve upland conditions.

Leopold (1997) notes that although at first glance the sources of sediment in a stream appear to be from eroding gullies and arroyos, available data suggests that sheet erosion of sheetwash, rills, and rain splash are the leading contributors of soil erosion. Leopold (1997) notes that "Sheet erosion is the most ubiquitous process contributing sediment to most rivers." Leopold (1997) further notes that "...plant cover on the land governs sediment yield" and that "The incorporation of the plant material in the uppermost layer of the soil affects its ability to absorb water."

Proposed utilization rates are 45 percent on several of the allotments. These include Upper Campbell Blue, Stone Creek, Turkey Creek, Bobcat-Johnson, Fishhook-Steeple Mesa, Cow Flat, KP, Raspberry, and Hickey. Should overutilization occur, even in small areas, greater impacts of grazing would occur on these allotments. Overutilization rates on those allotments with fair to very poor range conditions, poor soil stability, and poor riparian health would result in the greatest impacts. This would be the case for the following allotments:

- Upper Campbell Blue, where 50 percent of the range fails to meet Forest Plan standards and riparian conditions are rated as 10 percent satisfactory;
- Stone Creek, where range conditions are 52 percent poor and an additional 27 percent very poor, riparian conditions are unknown, and soils are 22 percent impaired;
- Turkey Creek, where riparian conditions are 95 percent unsatisfactory, range conditions are unknown, and soil conditions are 23 percent impaired;
- Bobcat-Johnson, where riparian conditions are known, and 64 percent of the range is in very poor condition, with 29 percent of the soils impaired;
- Fishhook-Steeple Mesa, where range conditions are unknown, riparian conditions are 60 percent unsatisfactory, and soils are 25 percent impaired and 56 percent unstable/unsuitable.
- Cow Flat, where 40 percent of the range is in very poor condition and 34 percent is in poor condition, 68 percent of the soils are impaired, and riparian conditions are unknown;
- KP, where range conditions are unknown, riparian conditions are 75 percent unsatisfactory, 20 percent of the soils are impaired and an additional 24 percent are unstable/unsuited;
- Raspberry, where range conditions are unknown and riparian conditions are 90 percent unsatisfactory; and
- Hickey, where 52 percent of the riparian areas are functioning at risk, 48 percent of the riparian areas are non-functional, 48 percent of the soils are impaired, 15 percent of the range is in poor condition, and 83 percent of the range is in fair condition.

It is the combination of these diminished environmental baseline conditions and the higher utilization rates that leads us to conclude that continued grazing will result in the further degradation of riparian and river conditions, and reduced condition of some constituent elements.

Cattle presence on streambanks will continue to occur along numerous intermittent and perennial, named and unnamed drainages across the 16 allotments, totaling approximately 333 miles. Cattle presence on streambanks destabilizes them through chiseling, sloughing, compaction, and collapse, and results in wider and shallower stream channels (Platts and Nelson 1985, Platts 1990, Meehan 1991). This may change the way in which flood flows interact with the stream channel and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation. These impacts occur at all levels of cattle presence, but increase as the number of livestock and the length of the grazing season increase (Marlow and Pogacnik 1985).

Cattle grazing in and on riparian vegetation may cause changes in the structure, function, and composition of the riparian community (Szaro and Pase 1983, Warren and Anderson 1987, Platts 1990, Schulz and Leininger 1990, Schulz and Leininger 1991, Stromberg 1993). Plant species diversity and structural diversity may be substantially reduced and nonnative species may be introduced through spread in cattle feces. Reduction in riparian vegetation quantity and health and shifts from deep-rooted to shallow-rooted vegetation contribute to bank destabilization and collapse and production of fine sediment (Meehan 1991). Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Karr and Schlosser 1977, Platts and Nelson 1985). Litter is reduced by trampling and churning into the soil thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). The capacity of the riparian vegetation to filter sediment and pollutants to prevent their entry into the river and to build streambanks is reduced (Lowrance *et al*. 1984, Elmore 1992). Channel erosion in the form of downcutting or lateral expansion may result (Heede *et al.* 1990, USBLM 1990).

The Forest Service will continue their commitment to exclude the Blue and San Francisco mainstem river riparian corridors from all cattle grazing. This will be important in repairing stream conditions within the Apache National Forest for spikedace and loach minnow. However, cattle grazing continues in other riparian areas within the proposed action area, and, in fact, may be concentrated there by existing conditions. The following comment was included in the BAE Addendums for the Upper Campbell Blue, Red Hill, Bush Creek, Fishhook-Steeple Mesa, KP, and Raspberry allotments:

> "Due to the topography and distribution of water on this allotment, livestock movement and use occurs primarily within the riparian corridors. Livestock concentration and use within riparian areas will reduce vegetative cover and sediment filtering capabilities. Livestock trampling and hoof action/shear results in reduced ground cover and water infiltration rates, and results in the physical alteration and destabilization of stream banks and channel morphology."

Because the numerous perennial and intermittent drainages on these allotments are tributaries to the Blue and San Francisco rivers, the condition of their streambanks and riparian vegetation contributes to the condition of these rivers, especially during high flow events. These effects are mostly seen as a part of the overall watershed effects. The riparian vegetation and streambank conditions along portions of these streams are important as buffers between upland impacts and the mainstem (Erman *et al*. 1977, Mahoney and Erman 1981, Osborne and Kovacic 1993). Deteriorated riparian and streambank conditions cannot adequately perform buffering functions.

Downstream Effects of Grazing

The effects of grazing in the upland do not stop at the allotment's interface with the river, or at the downstream end of the allotment. Excessive amounts of sediment, as generated through degraded conditions or removal of protective vegetation, may have deleterious effects not only in the immediate area, but in areas downstream because sediment generated on one allotment may travel substantial distances downstream. Meehan (1991) notes that "Generally, in grazed areas, stream channels contain more fine sediment..." Once entrained in the river, the erosion and deposition of sediment affect the channel's shape, size, and properties. Sediment that enters the stream does not immediately settle out, but instead the motion of flow constantly stirs up the water, with sediment particles carried along by the water rather than settling out. Leopold (1997) notes that "...the channel is adjusted in width, depth, and slope to handle the sediment that is received from the upstream river system." Spikedace and loach minnow require specific channel conditions for suitable habitat, as outlined in the constituent elements of the final rule designating critical habitat (USFWS 2000a). Changes in the slope affect the velocity of water, which may eliminate the runs and riffles necessary for spikedace and loach minnow habitat. Changes in width and depth may affect water temperatures. The effects of these changes on fish are summarized in Table 10 below.

Faunal Alteration

Livestock use of the riparian corridor causes change in species composition and community structure of the aquatic and riparian fauna, in addition to floral changes already addressed. The aquatic invertebrate community may be degraded because of altered stream channel characteristics, sediment deposition, or nutrient enrichment (Rinne 1988, Meehan 1991, Li *et al*. 1994). This change in the food base of many aquatic vertebrates, particularly fish, may contribute to loss of or change in the vertebrate community. In addition, the structure and diversity of the fish community may shift due to changes in availability and suitability of habitat types (Storch 1979, Van Velson 1979).

Summary of Effects

The FWS recognizes that some of the impacts to the watersheds in which the proposed action would be occurring have been caused by past grazing, private lands use, agriculture, roads, or other human activities. However, the following should be noted:

1) Watershed conditions within allotment boundaries for the proposed action are in unsatisfactory condition for 63 percent of the acreage where cattle would be grazing (i.e., FC or PC range).

2) While 48 percent of the soils are stable or satisfactory, 52 percent are impaired and unsatisfactory.

3) Twenty-eight percent of the range is in very poor condition, with an additional 28 percent in poor condition. Only 10 percent is in good or excellent condition.

4) The Alpine District provided information indicating that, for the four allotments assessed, 70 percent of the riparian area is in unsatisfactory condition. For the Clifton Ranger District, 76 percent of the area is functioning at risk, with an additional 23 percent non-functioning.

We therefore conclude that livestock grazing on the 16 allotments included within the proposed action area has contributed, and continues to contribute, to the overall degradation of the allotments and the Blue and San Francisco rivers, as well as other named and unnamed perennial and intermittent drainages, and to sub-optimum watershed conditions and functions within and downstream of the Allotment.

It is important to note that the Forest Service has recently made substantial changes to the grazing actions on the Alpine Ranger District. These changes, which were instituted beginning in 1996 involved the reduction of herds by 1/3 of the remaining herd each year for three consecutive years. This change is permanent, and reflected in the Term Grazing Permits for these allotments. The amount of time that has elapsed since the reduction is insufficient to allow a determination of effects on the range, soil, and riparian conditions present on these allotments. However, we believe that the reduced number of cattle, and in some cases, season of use, will be beneficial to the Blue and San Francisco rivers and to spikedace and loach minnow. While this change in grazing is not part of the on-going consultation, it is an integral part of the environmental baseline against which the proposed action is analyzed.

Species Specific Effects

The general effects of grazing on each of the species covered in this consultation are provided below. Effects to these species on the individual allotments is assessed in the following section, entitled "Allotment Specific Effects.

Spikedace and Loach Minnow

As noted above, 114 miles of critical habitat exist within the proposed action area, constituting 38 percent of the critical habitat for spikedace and loach minnow within Complex 6. The habitat within Complex 6 is considered extremely important to the survival of loach minnow as it represents the

longest stretch of occupied loach minnow habitat unbroken by large areas of unsuitable habitat. These miles also represent 27 percent of all occupied habitat for loach minnow. We concluded in the final critical habitat rule stated that the habitat designated as critical is "...essential for the recovery of these two species." (USFWS 2000a).

The critical habitat within the proposed action area is also considered extremely important to the recovery of spikedace in that it has substantial restoration potential throughout the Complex for this species.

The effects to spikedace and loach minnow from the proposed action are those detailed above as supported by existing literature, and in the following table:

Table 10. The effects of grazing, resulting effects on biological needs of the fish, and potential harm or harassment of the fish themselves.

Grazing Effect	Results In	Which May Harm or Kill Fish by
Decrease in roughness in the uplands, with increase in velocities and amounts of water coming off of the watershed	an increase in turbulence within the river	resulting in too little or too much oxygen in the water.
	An increase in the volume of flood flows with a decrease in their duration, leading to entrainment of fish in deep or rapidly flowing water	causing physical damage to the fish themselves.
Decrease in overhanging vegetation which shades the water, either directly by grazing, or indirectly by causing channel instability and changes in substrate that prevent riparian vegetation regeneration and persistence	an increase in solar radiation	resulting in too little or too much oxygen in the water.
	a decrease in channel shading	changing temperatures outside of the tolerance zone of fish.
Increase in turbidity in the water when excess sediments are transported into the stream system off of the watershed due to removal of vegetation in upland areas	a decrease in ability to locate prey items	starvation.
	a decrease in the number or type of prey items	starvation.

Grazing Effect	Results In	Which May Harm or Kill Fish by
	a decrease in the ability to locate a mate	delay in or prevention of reproduction
Changes to temperature regimes, flow patterns, and/or oxygen levels due to changes in flow patterns, amount of water in the channel, and alteration of riparian vegetation	a decrease in the number of type of prey items	starvation.
Addition of excess sediment to the channel, which fills in crevices in the rocks used by fish	a decrease in available crevices for suitable cover	predation.
	a decrease in suitable sites/surfaces for egg deposition	prevention of successful reproduction.
	a decrease in successful hatching due to smothering of deposited eggs	prevention of successful reproduction.
Alteration of the channel morphology, resulting in fewer shallow riffle complexes	entrainment of fish in deep or rapidly flowing water	causing physical damage to the fish themselves.
	a decrease in abundance of suitable habitat	delay in or prevention of successful reproduction.

Spikedace

As previously noted, spikedace have never been documented in the San Francisco or Blue rivers in Arizona. However, early sampling of fish in the area was almost nonexistent. It is likely that several native species, including spikedace, were extirpated from the entire San Francisco River basin since the 1960s. They continued to be present in the New Mexico portion of the San Francisco River until at least 1950 (Anderson 1978), near the Frisco Hot Springs and Pleasanton-Glenwood vicinity, about 20 to 25 miles upstream of the project area. Additionally, spikedace have been found approximately 30 miles away in Eagle Creek as recently as 1987 (Marsh *et al*. 1991).

Loach Minnow

Approximately 114 miles of that total 185.2 miles of critical habitat on these three river systems would be affected by the proposed action. This area is part of Complex 6 of critical habitat. The Federal

Register notice (USFWS 2000a) notes that most of the complex is occupied by loach minnow, and that the Blue River system and adjacent portions of the San Francisco River are the longest stretch of occupied loach minnow habitat unbroken by large areas of unsuitable habitat. As such, it is unique within the range of loach minnow. The constituent elements of critical habitat for loach minnow can be found in the Federal Register notice (USFWS 2000a), and are incorporated herein by reference.

The direct and indirect effects of grazing on aquatic habitat are discussed above. The FWS believes the proposed action is likely to adversely affect the fish themselves, as well as their biological needs. Necessary habitat elements for loach minnow include those elements that provide for primary biological needs of foraging, sheltering, dispersal, and reproduction. Table 10 above lists the effects of grazing, the resulting effects on biological needs of the fish, and the cause of the potential harm or harassment of the fish themselves. This discussion is based on fundamental principles of stream ecology, fish habitat, and grazing literature (Barber *et al*. 1970, Karr and Schlosser 1977, Anderson 1978, Gifford and Hawkins 1978, Duff 1979, Dobyns 1981, Barber and Minckley 1983, Blackburn 1984, Kauffman and Krueger 1984, Skovlin 1984, Platts and Nelson 1985, Abarca 1987, Chaney *et al*. 1990, Orodho *et al*. 1990, Platts 1990, Armour *et al* 1991, Propst and Bestgen 1991, Elmore 1992, Naiman 1992, Elmore and Kauffman 1994, Rosgen 1994, Myers and Swanson 1995, Fleischner 1994, Belsky and Blumenthal 1997, Belsky *et al.* 1999, Briggs 1996, Sayre 2001). While additional effects may also be possible, Table 10 above lists those the FWS believes are possible as a result of this grazing action.

The FWS believes that take may occur through harm and/or harassment, with harm defined as an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation that results in death or injury to the fish by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as intentional or negligent actions that create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding, or sheltering. A more thorough discussion of the indirect effects of the action and their effects on fish is found in Table 10 above. In summary, we believe that range, soil, and riparian conditions are severely deteriorated, and that components of the proposed action, such as utilization levels and/or herd size, exceed those that would promote sustainable and healthy rangelands given current range conditions. Because of the degraded range conditions and proposed utilization levels, the FWS believes that degradation of the various watersheds, and ultimately Campbell Blue Creek, the Blue River, and the San Francisco River, will continue. The FWS additionally believes that the effects of the grazing action within the proposed action area will continue downstream, and potentially upstream, of the multiple allotments. Cumulatively, the proposed action affects 38 percent of the critical habitat designated within Complex 6 for this species.

Mexican Spotted Owl

Potential nesting, roosting, and foraging habitat exists on the Pigeon and Wildbunch allotments, per the Consultation Forms. The Recovery Plan notes that restricted habitat provisions were made because it is recognized that owls may occur in areas other than protected habitat. Guidelines for riparian habitat,

which falls within the restricted category, were developed to maintain healthy riparian ecosystems where they exist and to initiate restoration measures to return degraded areas to healthy conditions. With respect to protected habitat, the Recovery Plan recommends that land managers "Protect...all areas in mixed-conifer and pine-oak types with slope >40 percent where timber harvest has not occurred in the past 20 years..." Because the Consultation Forms indicate that protected habitat is available, it is assumed that it is pine-oak or mixed-conifer with 40 percent or greater slopes. These areas are to be protected through the life of the Recovery Plan.

The Recovery Plan summarizes the effects of grazing to spotted owls in four broad categories: 1) altered prey availability; 2) altered susceptibility to fire; 3) degeneration of riparian plant communities; and 4) impaired ability of plant communities to develop into spotted owl habitat. With respect to prey base, Belsky and Blumenthal (1997) note that livestock grazing can reduce the amount of biomass available to be converted into litter, and therefore increase the proportion of bare ground. The Apache National Forest falls within the Upper Gila Mountain, Basin and Range-West, and Colorado Plateau Recovery Units for the Mexican Spotted Owl, as identified in the Recovery Plan, which notes for the Upper Gila Mountain RU that:

> "Overgrazing is suspected to be detrimental in some areas and can affect both habitat structure and the prey base. Effects on the prey base are difficult to quantify, but removal of herbaceous vegetation can reduce both food and cover available to small mammals (Ward and Block 1995). This may be especially true with respect to voles, which are often associated with dense grass cover. Direct effects on habitat are obvious in some places, particularly with respect to browsing on Gambel oak (*Quercus gambelii*). In some areas, oak is regenerating well but unable to grow beyond the sapling stage because of this browsing...We do not attribute these effects solely to livestock. Forage resources are shared by livestock and wild ungulates."

For the Basin and Range-West RU, the Recovery Plan notes that grazing primarily affects canyon stringers of pine-oak, mixed conifer, and riparian forests. The Recovery Plan notes that grazing is a threat in the southeastern portion of the Colorado Plateau RU as well.

The effects of livestock and wild ungulate grazing on the habitat of spotted owl prey species is a complex issue. Impacts can vary according to grazing species, degree of use, including numbers of grazers, grazing intensity, grazing frequency, and timing of grazing, habitat type and structure, and plant or prey species composition. Livestock can affect small mammals directly by trampling burrows, compacting soil, and competing for food, or indirectly by altering the structure or species composition of the vegetation in a manner that influences habitat selection by small mammals. Vegetation cover is often greatly reduced on grazed relative to ungrazed areas, and vegetation typically appears more dense in ungrazed areas. In one study, the total abundance of small mammals differed significantly between grazed and ungrazed plots, with the mean abundance of small mammals per census about 50 percent higher on plots from which livestock were excluded (Hayward *et al*. 1997). Bock and Bock (1994) reported that small mammal species that prefer habitats with substantial ground cover were more

abundant on an ungrazed site, whereas species that prefer open habitats were more abundant on grazed areas in their study area in southern Arizona.

With respect to altered susceptibility to fire, Belsky and Blumenthal (1997) note that livestock grazing alters forest dynamics by reducing the biomass and density of understory grasses and sedges, which otherwise out compete conifer seedlings and prevent dense tree recruitment, and by reducing the abundance of fine fuels, which formerly carried low-intensity fires through forests. Fire susceptibility is not likely to change during the life of this project.

Belsky and Blumenthal (1997) note that grazing can lead to compacted soils, which results in increased runoff and decreased water storage; and can also lead to increased erosion and runoff due to reduced plant cover and compacted soils. Both of these factors, which lead to the degeneration of riparian plant communities and impair the ability of plant communities to develop into spotted owl habitat, are expected to continue during the life of the project.

To minimize these impacts, the Recovery Plan recommends that grazing by livestock and wildlife be monitored in key areas, including riparian areas, meadows, and oak types. The Recovery Plan further recommends implementing and enforcing grazing utilization standards that would attain good to excellent range conditions within the key grazing areas. To do this, the Recovery Plan recommends incorporating allowable use levels based on current range condition, key species, and the type of grazing system. The Recovery Plan further recommends implementing management strategies that will restore good conditions to degraded riparian communities as soon as possible. Strategies to accomplish this may include reductions in grazing levels and increased numbers of exclosures, complete rest, as required, limited winter use, or other methods.

Chiricahua Leopard Frog

The effects of livestock grazing on ranid frog populations are not well-studied. Munger *et al*. (1994) found that sites with adult Columbia spotted frogs (*Rana luteiventris*) had significantly less grazing pressure than sites without spotted frogs. However, in a subsequent survey he found no differences (Munger *et al.* 1996). Bull and Hayes (2000) evaluated reproduction and recruitment of the Columbia spotted frog in 70 ponds used by cattle and 57 ponds not used by cattle. No significant differences were found in the number of egg masses or recently metamorphosed frogs in grazed and ungrazed sites. Seventeen percent of the sites were livestock tanks.

Maintenance of viable populations of Chiricahua leopard frogs is thought to be compatible with well-managed livestock grazing. Grazing occurs in most of the habitats occupied by this frog. For instance, a large and healthy population of Chiricahua leopard frogs coexists with cattle and horses on the Tularosa River in New Mexico (Randy Jennings, Western New Mexico University, pers. comm. 1995). Effects of grazing on Chiricahua leopard frog habitat probably include both creation of habitat and loss and degradation of habitats. Construction of tanks for livestock has created important leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats (Sredl and

Saylor 1998). Sixty-three percent of extant Chiricahua leopard frog localities in Arizona are stock tanks, versus only 35 percent of extirpated localities (Sredl and Saylor 1998), suggesting Arizona populations of this species have fared better in stock tanks than in natural habitats. Stock tanks provide small patches of habitat, which are often dynamic and subject to drying and elimination of frog populations. However, Sredl and Saylor (1998) also found that stock tanks are occupied less frequently by nonnative predators (with the exception of bullfrogs) than natural sites.

Adverse effects to the Chiricahua leopard frog and its habitat as a result of grazing may occur under certain circumstances. These effects include facilitating dispersal of nonnative predators; deterioration of watersheds; erosion and/or siltation of stream courses; trampling of egg masses, tadpoles, and frogs; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease (USFWS 2000b, Belsky *et al.* 1999, Ohmart 1995, Hendrickson and Minckley 1984, Arizona State University 1979, Jancovich *et al.* 1997). Creation of livestock waters in areas without aquatic habitats may provide the means for nonnative predators, such as bullfrogs and crayfish, to move across arid landscapes that would otherwise serve as a barrier to their movement. Increased erosion in the watershed caused by grazing can accelerate sedimentation of deep pools used by frogs (Gunderson 1968). Sediment can alter primary productivity and fill interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988).

Eggs, tadpoles, and metamorphosing Chiricahua leopard frogs are probably trampled by cattle on the perimeter of stock tanks and in pools along streams (USFWS 2000b). Juvenile and adult frogs can probably avoid trampling when they are active. However, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997), where they may be subject to trampling during the winter months. Cattle can remove bankline vegetation cover that provides escape cover for frogs and a source of insect prey. However, dense shoreline or emergent vegetation in the absence of grazing may favor some predators, such as garter snakes (*Thamnophis* sp.), and the frogs may benefit from some open ground for basking and foraging. At a tank in the Chiricahua Mountains, Sredl *et al.* (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die off of Chiricahua leopard frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die off.

Chytridiomycosis is known to occur within the proposed action area (M. Sredl, AGFD, pers. comm. 2001) at Juan Miller crossing on the Blue River. Thus, if chytrids are not already present, there may be a high probability of immigration to other portions of the action area. Chytrid fungus, which can survive in wet or muddy environments, could conceivably be spread by cattle carrying mud on their hooves and moving among frog habitats. The disease could also be spread by ranch hands working at an infected tank or aquatic site and then traveling to another site with mud or water from the first site. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, boots, or other equipment. Chytrids cannot survive complete drying, thus, if equipment is allowed to thoroughly dry, the likelihood of disease transmission is much reduced. Bleach or other disinfectants can also be used

to kill chytrids (Longcore 2000). Chytrids, if not already present, could immigrate to the allotments naturally via frogs or other animals.

Maintenance of roads and tanks needed for the grazing program could provide fishing opportunities and facilitate access by anglers, hunters, or other recreationists, who may inadvertently introduce chytrids or may intentionally introduce nonnative predators for angling or other purposes. Chytrids could be moved among aquatic sites during intentional introductions of fish or other aquatic organisms.

Stock tank maintenance typically occurs when tanks are dry or nearly dry. At that time, dams could be repaired or silt could be dredged out of the tanks. During drought, many leopard frogs probably disperse from drying tanks or are killed by predators as waters recede. However, some frogs persist in cracks in the mud of pond bottoms (M. Sredl, AGFD, pers. comm. 1999) or in clumps of emergent vegetation. Halfmoon Tank in the Dragoon Mountains went dry during June 1996 for 30 days or more. On July 21, 1996, 29 frogs of several different size classes were counted after the tank refilled with the summer monsoons (J. Rorabaugh, USFWS, pers. comm., 2002). Frogs probably took refuge in thick mats of cattails around the tank, but may have also stayed in cracks in the drying mud of the pond bottom, in rodent burrows, or other retreats that stayed moist. Frogs present in mud or in emergent vegetation could be killed or injured during silt removal or berm repair. If not killed, they may be flushed from moist retreats and die of exposure or dessication, or be killed by predators. If remaining wetted soils and emergent vegetation are completely disturbed or removed during cleaning out of a tank, a frog population could possibly be eliminated.

The Forest Service has not conducted any systematic evaluation of habitats in the majority of the riparian systems within the proposed action area. Because of the lack of surveys, the direct effects of cattle grazing within riparian areas and stock tanks or springs can not be fully assessed. In addition to the mechanical damage (trampling) associated with livestock grazing in riparian areas, livestock trampling along drainages and in the upper watershed may generate sediments and/or nutrients that could enter potentially occupied leopard frog habitat along the numerous intermittent and perennial drainages within the proposed action area. Sediments and/or nutrients may impact this species in the following ways: (1) sediments and/or nutrients may influence the invertebrate food base in some undefined manner by impacting the physical and vegetative characteristics of the aquatic habitat and (2) sediments may be detrimental to successful reproduction by smothering egg masses and early larval stages. In addition, eggs and tadpoles of Chiricahua leopard frogs may be trampled by domestic livestock along the perimeters of stock tanks and in pools along streams. Cattle can also contribute to degraded water quality at stock tanks, including elevated hydrogen sulfide concentrations, which are toxic to frogs (Sredl et. al 1997).

In summary, the effects to the Chiricahua leopard frog from the proposed action primarily occur in the riparian areas (in or associated with wetter areas), wetland communities, and stock tanks. Grazing effects also result from the trampling of egg masses, tadpoles, and frogs from livestock having direct access to aquatic habitat or stock tanks. Diseases such as chytrids can be moved among aquatic sites by cattle and operations.

Allotment-Specific Effects

Additional, allotment-specific effects of the proposed action, as noted by the Forest Service in the various BAEs and addendums, are provided below. It is important to note that Holechek *et al*. (1998) indicate that grazing capacity, utilization, condition, and trend data are *all* needed for sound range management decisions, and that this information is lacking for many of these allotments. The Environmental Baseline section above details species occurrences within or near each of the allotments.

Stone Creek Allotment

Our concerns with the proposed action on this allotment are limited to the downstream transport of sediment on the Blue River generated by continued grazing at utilization levels of up to 45 percent in riparian areas that are in poor condition and grazing at utilization levels of up to 40 percent on upland areas that are in poor or very poor condition over 79 percent of the allotment. We believe this action will add to the cumulative degradation of channel conditions in downstream portions of the Blue River. We do not anticipate that ponds or lakes potentially supporting leopard frogs will be affected by the proposed action as they are in a "no grazing" pasture.

Upper Campbell Blue Allotment

The Forest Service has indicated that livestock grazing on the upland areas of the allotment can result in changes to surface runoff timing and duration, sediment transport and production, and soil impacts and alterations that reduce infiltration rates and alter other hydrologic conditions of the watershed within and downstream of the allotment. The BAE notes that these alterations in watershed processes result in changes to stream morphology and water velocity, increases in sedimentation rates, and alterations to the natural hydrograph. The BAE further notes that, because of the topography and distribution of water on this allotment, livestock movement and use occurs primarily within the riparian corridors, and that concentration of livestock in riparian areas will reduce vegetative cover and sediment filtering capabilities.

The BAE concludes that livestock grazing on the Upper Campbell Blue Allotment will continue to impact water quality, quantity, timing, and duration through continued alterations in hydrologic functions and processes, and that the resulting erosion and sedimentation into Coleman Creek and its tributaries, Campbell Blue Creek and its tributaries, and the Blue River will be detrimental to spikedace and loach minnow critical habitat downstream of the allotment boundaries.

Our concerns with the proposed action on this allotment are primarily the downstream transport of sediment generated by continued grazing at utilization levels of up to 45 percent in riparian areas that are in unsatisfactory condition and grazing at utilization levels of up to 40 percent on upland areas where 50 percent of the soils and 50 percent of the range conditions do not meet Forest Plan standards. The proposed action would continue on this allotment for three years. The effects of the action are offset by the short duration of use (3.5 months), stable soils, and timing of use during the dormant season. We

agree with the Forest Service's description of adverse effects to critical habitat as we believe that this action will add to the cumulative degradation of channel conditions in downstream portions of Upper Campbell Blue Creek, East Fork Black River, and the Blue River. In addition, we believe that grazing on the Upper Campbell Blue Allotment adversely affects loach minnow in downstream portions of the Blue River through the effects listed in the loach minnow section below. The Forest Service has similarly concluded that the proposed action is likely to adversely affect Chiricahua leopard frogs. Our concerns for increased erosion and sedimentation for spikedace and loach minnow are of concern for frogs also. These concerns apply to Campbell Blue Creek as well as the Blue River. In addition, there are multiple large and one small stock tank, as well as several large ponds that may support suitable habitat and that have not been surveyed for frogs. Effects from livestock actions at ponds can include trampling by cattle, removal of cover vegetation by cattle, transfer of chytrid fungus by cattle or ranch personnel, and removal of habitat during tank maintenance. Specific details on these effects are detailed above under Effects of the Action.

Turkey Creek Allotment

The Addendum to the BAE notes that livestock will concentrate in riparian corridors due to the topography and distribution of water on the allotment. The anticipated effects of this concentration are a reduction of vegetative cover and sediment filtering capabilities. The BAE further notes that livestock trampling and hoof action/shear results in reduced ground cover, reduced infiltration rates, and destabilization of stream banks and channel morphology.

The BAE Addendum further notes that:

> "Livestock grazing on this allotment will continue to impact water quality, quantity, timing and duration through continued alterations in hydrologic functions and processes. The resulting erosion and sedimentation into Pace Creek and its tributaries, Campbell Blue Creek and its tributaries, and the Blue River will be detrimental to loach minnow critical habitat. Increased sedimentation in the interstitial spaces of loach minnow habitat is detrimental to loach minnow reproduction and will impact and alter the quantity and composition of their invertebrate food base. Several of the critical habitat constituent elements necessary for the loach minnow will be adversely affected; such as low amounts of fine sediment and substrate embeddedness, an abundant aquatic insect food base, and spawning areas with uncemented cobble substrate."

We believe this is an accurate assessment. The proposed action on this allotment will continue grazing of cattle at a utilization rate of 45 percent within riparian corridors that are 95 percent in unsatisfactory condition, and at 40 percent in upland areas where conditions have not been assessed. The proposed action would continue for three years. We believe that this action will contribute to degraded riparian conditions within three miles of established critical habitat along Campbell Blue Creek within the allotment, and will contribute to cumulative degradation of channel conditions in critical habitat in areas downstream of the allotment. In addition, we believe that grazing on the Turkey Creek Allotment is

likely to adversely affect loach minnow within and downstream of the allotment in portions of the Blue River through the effects detailed below under the loach minnow section.

Although the Forest Service indicated within the BAE that no surveys have been completed, our records indicate a frog record from 1979. Subsequent surveys in 1994 and 1995 did not locate frogs. Frogs are known to inhabit the Blue River immediately downstream of the Allotment boundary. Additionally, other frogs were located approximately four miles to the west in Coleman Creek as recently as 2001. Campbell Blue Creek runs west to east through the southern portion of this allotment. There are also three large ponds within the allotment boundary, two of them in pastures to be grazed. The Blue River is located immediately downstream of the allotment. Because Campbell Blue Creek is a tributary to the Blue River, and because frogs are known to occur to the southeast and west of the Allotment, and historically within Allotment boundaries, we believe there is a potential for occupancy on this allotment. With respect to the effects of the action on the frog, we believe there is a potential for impacts to frogs from tank maintenance activities such as dredging or silt removal; injury at tanks due to transmission of disease by cattle or ranch hands; and direct or indirect mortality at those tanks grazed by livestock as a result of cattle wading into stock tanks, removing shoreline or aquatic cover at egg deposition sites, and increasing turbidity. With respect to riverine habitats, cattle grazing has been precluded along the mainstem Blue River, but continues along Campbell Blue Creek. Therefore, the removal of shoreline vegetation or aquatic cover at egg deposition sites, increasing turbidity, and trampling are of concern along Campbell Blue Creek as well. Finally, the effects of grazing in the Turkey Creek Allotment on Chiricahua leopard frog habitat may also include indirect effects due to increases in sedimentation generated by grazing levels as specified under spikedace and loach minnow above.

Bobcat-Johnson Allotment

As with previous allotments, the BAE Addendum notes that livestock will concentrate in riparian corridors due to the topography and distribution of water on the allotment. As stated above, livestock concentration and use within riparian areas will reduce vegetative cover and sediment filtering capabilities. Additionally, livestock trampling and hoof action/shear results in reduced ground cover, reduced water infiltration rates, and alteration and destabilization of stream banks and channel morphology.

The Addendum to the BAE notes that the aquatic and riparian habitats within the allotment are highly degraded from past and ongoing management activities, and provide little or no buffering or filtering capability before entering the Blue River and Campbell Blue Creek. As noted further in the BAE Addendum,

> "Livestock grazing on this allotment will continue to impact water quality, quantity, timing and duration through continued alterations in hydrologic functions and processes. The resulting erosion and sedimentation into the Blue River and its tributaries and Campbell Blue Creek will be detrimental to loach minnow critical habitat. Increased sedimentation in the interstitial spaces of loach minnow habitat is detrimental to loach minnow reproduction and will impact and alter

> the quantity and composition of their invertebrate food base. Several of the critical habitat constituent elements necessary for the loach minnow will be adversely affected; such as low amounts of fine sediment and substrate embeddedness, an abundant aquatic food base, and spawning areas with uncemented cobble substrate."

The proposed action on this allotment will continue grazing of cattle at a utilization rate of up to 45 percent within riparian corridors outside of the Blue River that are 66 percent in unsatisfactory condition, and at 40 percent in upland areas where conditions have not been assessed. As proposed, the action would continue for three years. We believe this action will maintain the riparian conditions within established critical habitat along the Blue River, and will contribute to cumulative degradation of channel conditions in areas adjacent to and downstream of the allotment. In addition, we believe that grazing on the Bobcat-Johnson Allotment is likely to adversely affect loach minnow in the Blue River within and downstream of Allotment boundaries.

Our data indicate that two separate surveys in 1979 located frogs within Allotment boundaries, but that followup surveys in 1987 and 1992 at these sites failed to detect frogs. However, additional frogs were located during a survey in 1994 within Allotment boundaries (AGFD Herp Database 2002). The Allotment does contain five large lakes or ponds and a small stock tank, as described previously. The FWS therefore believes that Chiricahua leopard frogs are reasonably certain to occur.

Foote Creek Allotment

Little information was provided on conditions within the Foote Creek Allotment. The AMP notes that increases in sedimentation, if they were to occur, would result from Foote Creek, which is a tributary to the Blue River. The AMP notes that increases in sedimentation could indirectly impact loach minnow by altering the abundance and diversity of aquatic invertebrates on which they feed, and that sedimentation in the interstitial spaces of cobble and gravel in riffle and run habitat could negatively affect reproductive success. On the Foote Creek Allotment, the West Thomas Pasture is not grazed until after 8/31 to allow for riparian habitat recovery for Mexican spotted owls. This may be beneficial to loach minnow, as well as critical habitat for spikedace and loach minnow. An additional 40 acres of the West Thomas Pasture of Foote Creek are not used because they are included as part of a research natural area.

Our concerns with the proposed action on this allotment are due to the continued grazing of a large number of cattle within riparian corridors of tributaries on the Allotment for which condition has not been assessed, and in upland areas that are classified as 64 percent in very poor condition, with an additional 24 percent in poor condition. The effects from this action would continue for at least seven years, as currently proposed. The effects may be partially offset by the high proportion (70 percent) of stable soils and use during the dormant season. We believe that this action will contribute to degraded riparian conditions within tributaries of the Blue River, and will contribute to cumulative degradation of channel conditions in areas downstream of the allotment. In addition, we believe that grazing on the Foote Creek Allotment will negatively impact loach minnow in downstream portions of the Blue River.

The Foote Creek Allotment is separated by the Blue River by approximately three miles, and Foote Creek is a tributary to the Blue River. There are multiple lakes and ponds, primarily in the west half of the allotment away from Foote Creek. These areas may or may not be suitable for occupancy by Chiricahua leopard frogs. Our concerns for the Foote Creek Allotment would be for the downstream transport of sediment by Foote Creek into the Blue River.

Red Hill Allotment

With respect to the specific on-the-ground effects of grazing on the Red Hill Allotment, the BAE Addendum notes that "Degraded riparian and aquatic habitat conditions within the allotment are the result of past and ongoing management actions that have resulted in reduced ground cover and other vegetative and physical alterations of upland and riparian conditions. These impacts and alterations to hydrologic processes have resulted in changes to stream channel morphology and other physical, biological, and chemical characteristics of aquatic and riparian habitat within and downstream of the allotment."

The BAE Addendum further notes that livestock movement occurs primarily within the riparian corridors, and that livestock concentration and use within riparian areas will reduce vegetative cover and sediment filtering capabilities. Livestock trampling and hoof action/shear results in reduced ground cover and water infiltration rates, and results in the physical alteration and destabilization of stream banks and channel morphology. The BAE Addendum indicates that the anticipated consequences of the proposed action for Red Hill are that

> "Livestock grazing on this allotment will continue to impact water quality, quantity, timing and duration through continued alterations in hydrologic functions and processes. The resulting erosion and sedimentation into the Blue River and its tributaries will be detrimental to loach minnow critical habitat. Increased sedimentation in the interstitial spaces of loach minnow habitat is detrimental to loach minnow reproduction and will impact and alter the quantity and composition of their invertebrate food base. Several of the critical habitat constituent elements necessary for the loach minnow will be adversely affected; such as low amounts of fine sediment and substrate embeddedness, an abundant aquatic food base, and spawning areas with uncemented cobble substrate."

While excluding cattle from the riparian corridor along the Blue River will allow for habitat improvement for spikedace and loach minnow, the BAE Addendum notes that

> "Although both direct and indirect effects to loach minnow have been reduced by fencing the Blue River corridor, livestock continue to concentrate within Bush, Tutt, and Foote creeks. Increases in sedimentation to the Blue River from the Red Hill Allotment is expected as a result of ongoing livestock grazing activities. Poor watershed, soil, and range conditions, combined

> with continued livestock grazing and severe use within tributary channels, may contribute to altering the hydrologic regime (water quantity, quality, intensity, duration, and pattern) within Bush, Tutt, and Foote creeks, and the Blue River drainage, thereby increasing erosion and sedimentation into the Blue River and occupied loach minnow habitat. The accumulation of sediments in the interstitial spaces of cobbles and gravels in riffle habitats is especially detrimental to successful reproduction of loach minnow, and impacts the invertebrate food base."

The EA notes that "Livestock would be on the allotment during the spring time when excessive use of the lower riparian areas has occurred, however, livestock numbers in balance within capacity would alleviate this somewhat. This alternative would offer some opportunity for riparian recovery." The EA further notes that "Recovery would depend somewhat on recovery of the upland watersheds." The Forest Service concludes in the EA that portions of riparian areas would trend towards proper functioning condition, but that riparian areas with heavy concentrations of ungulates would not improve to satisfactory condition.

The proposed action on this Allotment will continue on rangelands where range conditions are classified as 78 percent very poor and 18 percent poor. The EA notes that the alternative would not provide for wild ungulate herbaceous forage needs, and would result in "...the overuse of plants on the grazing capability classes of FC and possibly PC range." While half of the riparian areas are in proper functioning condition, half are functioning at risk, with a downward trend. The proposed action would continue for eight years on this allotment. The adverse effects may be partially offset by the low number of cattle, at 45 cow/calf units from 2002 - 2003, and 15 cow/calf units from 2004 - 2008, and by somewhat reduced utilization levels of 25 percent in poor areas and 35 percent in fair areas. It should be noted that the limitation of utilization to 10 percent on the 78 percent of the Allotment rated as very poor will result in a concentration of grazing on the remaining 1,639 acres of the Allotment. Only 4 percent of the Allotment is in fair condition, so the bulk of the grazing will need to continue on the 18 percent of the Allotment which is already in poor condition.

We believe that this action will contribute to degraded riparian conditions within established critical habitat along three miles of the Blue River, and will contribute to cumulative degradation of channel conditions in areas downstream of the allotment. In addition, we believe that grazing on the Red Hill Allotment is likely to adversely affect loach minnow found within allotment boundaries, as well as those in downstream portions of the allotment.

The GIS information provided by the Forest Service indicates that there are no stock ponds, lakes, or ponds within Allotment boundaries. In addition, the Blue River flows north to south through the allotment. No surveys have been conducted by the Forest Service on this portion of the Blue River for Chiricahua leopard frogs. The nearest known frog record is approximately one mile from the Allotment, and was recorded in 1979, with subsequent surveys in1987 and 1992 failing to find frogs. Because recent surveys indicate that no frogs occur in this portion of the Blue River, our concerns are

only for downstream transport of sediment generated from this Allotment into frog habitat on the Blue River.

Bush Creek Allotment

With respect to the specific on-the-ground effects of grazing on the Bush Creek Allotment, the BAE Addendum notes that "Degraded riparian and aquatic habitat conditions within the allotment are the result of past and ongoing management actions that have resulted in reduced ground cover and other vegetative and physical alterations of upland and riparian conditions. These impacts and alterations to hydrologic processes have resulted in changes to stream channel morphology and other physical, biological, and chemical characteristics of aquatic and riparian habitat within and downstream of the allotment." As noted previously for other allotments in this consultation, the Forest Services indicates that livestock movement occurs primarily within the riparian corridors due to topography and water distribution.

The BAE Addendum further notes that:

> "Increases in sedimentation to the Blue River from Bush and Steeple creeks on the Bush Creek Allotment is expected as a result of ongoing livestock grazing under the existing unsatisfactory soil and range conditions and degraded status of the tributary streams. Poor watershed and range conditions within the allotment, combined with continued livestock grazing, may contribute to altering the hydrologic regime (water quantity, quality, intensity, duration, and pattern) with Bush and Steeple creeks and the Blue River drainages, thereby increasing erosion and sedimentation into the Blue River. The accumulation of sediments in the interstitial spaces of cobbles and gravels in riffle habitats is especially detrimental to successful reproduction of loach minnow and impacts the invertebrate food base."

Initially, the FWS had fewer concerns with this Allotment, due to the small number of livestock (four horses and no cattle) proposed for grazing here. However, only limited assessments have been completed on conditions. The Forest Service has verbally notified us that the range is in poor condition with a downward trend, and some areas are in very poor condition (B. McKinney, USFS pers. comm. 2002). Additionally, the riparian areas are poor, and the soils are impaired. The proposed action would continue for three years on this Allotment. Additionally, Forest Service biologists have concluded that "Even though the Bush Creek Allotment is small in size with few head of livestock, it is one of many in the watershed with high proportions of impaired soils, poor to very poor range condition, and unsatisfactory riparian areas. The naturally fragile status of the watershed makes the Blue River even more sensitive to the affects of livestock management activities."

We believe that any grazing on this allotment, due to its very poor conditions, will contribute to degraded riparian conditions within established critical habitat along one mile of the Blue River within Allotment boundaries, and will contribute to cumulative degradation of channel conditions in areas

downstream of the allotment. In addition, we believe that grazing on the Bush Creek Allotment will have negative effects to loach minnow both within and downstream of the Allotment.

The Forest Service did not request consultation for Chiricahua leopard frog on this Allotment.

Fishhook-Steeple Mesa Allotment

With respect to the specific on-the-ground effects of grazing on the Fishhook-Steeple Mesa Allotment, the BAE Addendum notes that livestock use will be concentrated in the riparian corridors due to topography and water distribution on the Allotment. Livestock concentration and use within riparian areas will reduce vegetative cover and sediment filtering capabilities, and hoof action/shear results will result in reduced ground cover and water infiltration rates, and the physical alteration and destabilization of streambanks and channel morphology." Forest Service staff concluded that livestock grazing on this Allotment would continue to impact water quality, quantity, timing, and duration through continued alterations in hydrologic functions and processes. They noted that erosion and sedimentation into the Blue River and its tributaries would be detrimental to loach minnow critical habitat.

The proposed action will take place with continued 45 percent utilization levels on an allotment where 56 percent of the soils are classified as unstable/unsuited, with an additional 25 percent in the impaired/unsatisfactory category; where riparian conditions are listed as 60 percent unsatisfactory; and where range conditions have not even been assessed. Grazing would occur for approximately 7.5 months throughout the growing season at utilization rates of 45 percent in riparian areas and 40 percent in upland areas, which we consider high, given current conditions. We believe that this action will contribute to degraded riparian conditions within the nine miles of established critical habitat along the Blue River, and will contribute to cumulative degradation of channel conditions in areas of critical habitat downstream of the allotment. In addition, we believe that grazing on the Fishhook-Steeple Mesa Allotment will negatively impact loach minnow found within allotment boundaries, as well as those downstream.

The status of frogs within this Allotment remains unknown, and the nearest known Chiricahua leopard frogs were found at one site upstream approximately seven miles on the Blue River in 1972. Subsequent surveys in 1987 and 1992 did not detect any frogs (AGFD Herp Database 2002). Frogs were detected at a second site in this area as recently as 1994, and at a downstream site in 1994. No subsequent surveys have been completed. Frogs are present upstream and downstream of the Allotment, and suitable habitat exists on the perennial Blue River in between these populations and along the northern portion of this Allotment. The Allotment does contain livestock tanks, springs and cienegas and streams that drain into the Blue River. The FWS believes that Chiricahua leopard frogs are not reasonably certain to occur.

Cow Flat Allotment

With respect to the on-the-ground effects of grazing on the Cow Flat Allotment, the BAE Addendum notes that use would be during the cool season growth period, generally March through May at these elevations. The BAE Addendum notes problems with the proposed rotation of pastures in that there would be an imbalance in the capacity between the two sets of winter pastures where Lanphier can support 881 AUMs and others only 373 AUMS. The EA notes that monitoring would be required to determine if cattle need to be removed early from pastures capable of supporting the lower number of AUMs.

The BAE Addendum further notes that:

> "Livestock grazing on this allotment will continue to impact water quality, quantity, timing and duration through continued alterations in hydrologic functions and processes. The resulting erosion and sedimentation into the Blue River and its tributaries will be detrimental to loach minnow critical habitat. Increased sedimentation in the interstitial spaces of loach minnow habitat is detrimental to loach minnow reproduction and will impact and alter the quantity and composition of their invertebrate food base. Several of the critical habitat constituent elements necessary for the loach minnow will be adversely affected; such as low amounts of fine sediment and substrate embeddedness, an abundant aquatic insect food base, and spawning areas with uncemented cobble substrate."

Our primary concerns for the proposed action on this allotment are continued grazing for a period of seven years on an allotment where range conditions are classified as 40 percent very poor and 34 percent poor, with soils that are 68 percent impaired, and where riparian conditions have not been assessed but are likely impaired. Grazing would entail 110 cow/calf units for seven months, all during the growing season. Utilization levels would be at 20 percent on very poor range, 35 percent on poor range, and 45 percent on fair range. As with the Red Hill Allotment, grazing will be reduced to 20 percent on 40 percent of the allotment, and to 35 percent on 34 percent of the allotment, so that use becomes concentrated on the remaining acreage (5,957 acres) where conditions are only fair. Additionally, we believe that these utilization rates are high given the on-the-ground conditions, and that they will lead to continued degradation. None of the Allotment is currently in excellent, or good, range condition.

The Forest Service concluded that "Livestock management under the proposed/ongoing action will not reduce effects to an insignificant or discountable level, and the proposed/ongoing action is likely to adversely affect loach minnow critical habitat in the Blue River." We believe that this action will contribute to degraded riparian conditions within the three miles of established critical habitat along the Blue River, and will contribute to cumulative degradation of channel conditions in critical habitat areas downstream of the allotment. In addition, we believe that grazing on the Cow Flat Allotment is likely to

adversely affect loach minnow found both within allotment boundaries and in downstream portions of the Blue River.

Frogs were located approximately four miles upstream in 1979, however, surveys in 1987 and 1992 did not detect any frogs (AGFD Herp Database 2002). Frogs were detected at a second site in this area as recently as 1994, and at a downstream site in 1994. No subsequent surveys have been completed. Frogs are present upstream and downstream of the Allotment, and suitable habitat exists on the perennial Blue River in between these populations and along the northern portion of this Allotment. The Allotment does contain livestock tanks, springs and cienegas and streams that drain into the Blue River. Specifically, there are seven large lake or ponds on the allotment, with four in close proximity to the Blue River. These areas have not been surveyed. The FWS therefore believes that Chiricahua leopard frogs are not reasonably certain to occur.

KP and Raspberry Allotments

With respect to the on-the-ground effects of grazing on the KP and Raspberry allotments, the BAE Addendum concludes that "Degraded riparian and aquatic habitat conditions within the allotment are the result of past and ongoing management actions that have resulted in reduced ground cover and other vegetative and physical alterations of upland and riparian conditions. The impacts and alterations to hydrologic processes have resulted in changes to stream channel morphology and other physical, biological, and chemical characteristics of aquatic and riparian habitat within and downstream of the allotment."

The Forest Service again concluded that livestock movement occurs primarily within the riparian corridors on this allotment. The effects from grazing and concentration of livestock within the riparian corridors can be summarized as reduced ground cover and water infiltration rates, and physical alteration and destabilization of stream banks and channel morphology. The Forest Service concludes that:

> "Livestock grazing on these allotments will continue to impact water quality, quantity, timing, and duration through continued alterations in hydrologic functions and processes. The resulting erosion and sedimentation into the Blue River and its tributaries will be detrimental to loach minnow critical habitat. Increased sedimentation in the interstitial spaces of loach minnow habitat is detrimental to loach minnow reproduction and will impact and alter the quantity and composition of their invertebrate food base. Several of the critical habitat constituent elements necessary for the loach minnow will be adversely affected; such as low amounts of fine sediment and substrate embeddedness, an abundant aquatic insect food base, and spawning areas with uncemented cobble substrate."

Our concerns with the proposed action on these allotments are largely based on the anticipated effects of grazing at 40 percent utilization where range conditions have not been assessed. Similarly, we

believe that continued riparian degradation will continue due to the proposal to graze riparian areas at 45 percent, even though they are currently rated as being in unsatisfactory condition over 75 percent of the Allotment. Effects from the proposed action would continue for three years. Grazing numbers would be low, at 46 cow/calf units, but would occur for 7.5 months, throughout the growing season, with resulting reductions in plant recovery anticipated.

The Forest Service has concluded that livestock management under the proposed action will not reduce effects to an insignificant or discountable level, and that the proposed action is likely to adversely affect spikedace and loach minnow critical habitat. This is likely to occur on nine miles of critical habitat within the Raspberry Allotment. Additionally, the proposed action is likely to adversely affect loach minnow that currently occupy the Blue River within the Raspberry Allotment boundaries.

The Forest Service has not conducted surveys for frogs within the Allotment. Frogs were located approximately fifteen miles upstream in 1979, however, surveys in 1987 and 1992 did not detect any frogs (AGFD Herp Database 2002). Frogs were detected at a second site in this area as recently as 1994, and at a downstream site in 1994. No subsequent surveys have been completed. Frogs are present upstream and downstream of the Allotment, and suitable habitat exists on the perennial Blue River in between these populations. Because individual frogs have been known to migrate up to five miles (Seburn *et al.* 1997), and because of the presence of suitable habitat, we believe that this Allotment could be occupied by Chiricahua leopard frogs. In addition to the Blue River which passes along the eastern boundary of the KP Allotment and through the Raspberry Allotment, there are several springs and ponds which may provide suitable habitat.

Pigeon Allotment

The Consultation Forms note that impacts to the watershed from livestock may affect various parameters of spikedace and loach minnow critical habitat, including but not limited to the level of base flows and peak flows, and the amount of sediment entering and being transported through aquatic habitats. The Forest Service further notes that these hydrologic processes can in turn influence substrate characteristics and general morphological characteristics of the channel, including frequency of riffle, run, pool habitats, and perhaps the abundance and distribution of nonnative fish.

It is important to remember the baseline conditions when determining the effects of the proposed action. The Consultation Forms note that "Soils within the allotment are typically not functioning properly and normally. Soil function apparently is being sustained on only about 13 percent of the soils on the allotment. Of the remaining 87 percent of the allotment, almost two-thirds of the allotment (62 percent) includes soils that are inherently unstable and/or unstable due to past human-related activities." Our additional concerns include that range conditions are rated as being from poor to fair condition with apparent trend being variable between pastures and foraging areas within the allotment. Only small portions of the Blue River form the boundary of the Pigeon Allotment. River miles assessed indicate that these miles are functioning at risk, with an upward trend. Impacts for this allotment will include

grazing 220 cow/calf units at 40 percent utilization during the dormant season, and at 25 percent utilization during the growing season. There are 8.2 miles of the Blue River adjacent to the Pigeon Allotment which could potentially be affected by upland conditions on the Allotment.

No surveys have been conducted for Mexican spotted owls within the Pigeon Allotment. Approximately 555 acres of restricted and protected habitat have been identified along Pigeon Creek, Turkey Creek, HL Canyon, and the San Francisco River. All protected habitat, except riparian areas that may be occupied, would occur in "no capacity" areas for livestock, which are not expected to have extensive livestock use, according to the Consultation Forms.

Because of the lack of surveys for spotted owls, the proposed action does not meet the Grazing Guidance Criteria (USFS 1998) adopted by both the FWS and Forest Service that would allow it to be classified as a "no effect" or "not likely to adversely affect". The BAE concludes that "The District has not provided any supporting information that the proposed grazing levels would provide the woody and herbaceous vegetation necessary for good to excellent range and ecological condition in the foreseeable future. In fact, the range, soil, and watershed condition data provided by the District portrays an ecological condition that may not benefit from any livestock grazing." The Consultation Forms further note that "Current authorized stocking levels are significantly above capacity, as estimated in this analysis. Cover for rodent species (woody & herbaceous) is currently less than desirable and range condition is less than good to excellent." The Consultation Forms further note that "The District has not provided any supporting documentation that the proposed action was developed to attain good to excellent range and ecological condition." The Forest Service concludes that "No surveys have been conducted for this species, on or adjacent to the allotment. Restricted and protected habitat (approximately 555 acres) has been identified along Pigeon and Turkey Creeks, HL Canyon, and the Blue River. In the absence of surveys it is assumed that this species may occur within or adjacent to the allotment. Therefore, human disturbance and construction actions associated with the grazing allotment could occur within occupied habitat during the breeding season, and livestock could occur within occupied or unoccupied Mexican spotted owl habitats."

A thorough description of upland range conditions and riparian conditions is provided in the Environmental Baseline. The riparian condition, as assessed through the Proper Functioning Conditioning methodology, is described as functioning at risk, with an upward trend. We anticipate that degraded watershed conditions will continue due to the proposed utilization rates, and may adversely affect habitat used or potentially used by Mexican spotted owls.

The Forest Service has determined that this Allotment is occupied by Chiricahua leopard frogs. Suitable habitat exists along the Blue River and San Francisco rivers, which form the eastern boundary of the Allotment, as well as in numerous springs and ponds on the Allotment. The potential effects of grazing in the Pigeon Allotment are described above under the Turkey Creek Allotment.

<u>Wildbunch Allotment</u>

With respect to the on-the-ground effects of grazing on the Wildbunch Allotment, the Consultation forms note that, despite recent fencing, the Clifton Ranger District has had repeated problems with livestock from this allotment entering the Blue River corridor. The District has responded with administrative action. The Consultation Forms concluded that "Assuming no direct effects occurs in the future, the proposed action to graze livestock on the Wildbunch allotment may impact loach minnows indirectly through livestock-caused alterations of edaphic and vegetative components on the Blue and San Francisco River watersheds within the allotment."

Our concerns with the proposed action are based partly on the existing baseline and situation on the Allotment. Utilization rates on upland portions of the Allotment have been high in areas, with a compliance inspection report finding utilization rates on herbaceous plants at >50 percent along Cienega Creek, and at 35 to 60 percent along drainage bottoms in Oak Springs Canyon within the Roan Cow Pasture. The Consultation Forms conclude that "Soils within the allotment are typically not functioning properly and normally. Soil function apparently is being sustained on about 23 percent of the soils on the allotment. Of the remaining 77 percent of the allotment, almost two-thirds of the allotment (64 percent) includes soils that are inherently unstable and/or unstable due to past human-related activities...Based largely on soils conditions, livestock grazing is incompatible (i.e., "No Capability") on about 41 percent of the allotment." No information was provided indicating that additional oversight will be exercised to keep the action within the proposed description. The proposed action is for one year, but would allow 225 cow/calf units to graze at varying utilization rates between 25 and 45 percent. The effects of the action may be offset by the short duration of the action, and by range conditions that are classified as 78 percent fair. Loach minnow found within Allotment boundaries will be negatively impacted.

No surveys have been conducted for Mexican spotted owls within the Wildbunch Allotment. Approximately 350 acres of restricted habitat have been identified by the District along the Blue River. Additional restricted habitat may occur along some of the perennial drainages, but only as short, narrow stringers of riparian hardwoods.

Because of the lack of surveys, the proposed action does not meet the Grazing Guidance Criteria (USFS 1998) adopted by both the FWS and Forest Service that would allow it to be classified as a "no effect" or "not likely to adversely affect". The BAE concludes that "The District has not provided any supporting information that the proposed grazing levels would provide the woody and herbaceous vegetation necessary for good to excellent range and ecological condition in the foreseeable future. In fact, the range, soil, and watershed condition data provided by the District portrays an ecological condition that may not benefit from any livestock grazing." The Consultation Forms further note that "Current authorized stocking levels are significantly above capacity, as estimated in this analysis. Cover for rodent species (woody & herbaceous) is currently less than desirable and range condition is less than good to excellent." The Consultation Forms add that "The District has not provided any supporting documentation that the proposed action was developed to attain good to excellent range and ecological condition." The Forest Service concludes that "No surveys have been conducted for this

species within the allotment, therefore, no PAC's have been delineated. Restricted habitat (350 acres) has been identified by the District along the Blue River, adjacent to the Allotment."

A thorough description of upland range conditions and riparian condition is provided above in the Environmental Baseline. As assessed through the Proper Functioning Conditioning methodology, riparian areas on the Wildbunch Allotment are described as 87 percent functioning at risk, upward trend, and nine percent nonfunctioning. We anticipate that degraded watershed conditions will continue due to the proposed utilization rates, and will adversely affect habitat used or potentially used by Mexican spotted owls.

The Forest Service has determined that the Wildbunch Allotment is occupied by Chiricahua leopard frog for the length of the Blue River, which forms the western boundary of the Allotment. Additional suitable habitat exists in the San Francisco River and in numerous springs and ponds on the Allotment. The potential effects of grazing on this Allotment on the frog are detailed above under the Turkey Creek Allotment.

Sardine Allotment

The Consultation Forms further note that "Existing watershed and riparian conditions are primarily a result of current and historical livestock grazing and have resulted in reduced ground cover, stream channel down cutting and widening, alteration of hydrologic processes; and degradation of aquatic, fisheries and riparian conditions." Impacts from the proposed action will be occurring on degraded conditions, including soils that are classified as 0.2 percent satisfactory, 19.8 percent impaired, and 80 percent unsatisfactory. No assessment has been conducted for riparian habitat, and 72 percent of the range is in poor conditions. The proposed action would occur for nine years. We believe these conditions will be exacerbated by grazing at 40 percent utilization during the dormant season and 25 to 30 percent utilization during the growing season by 30 to 45 cow/calf units. Our primary concern is the effects of any grazing on soils that are almost entirely in impaired/unsatisfactory conditions, coupled with range that is predominantly in poor condition. Data are not available for riparian conditions on this allotment. However, degraded riparian conditions likely exist on this Allotment, as they do in surrounding allotments, and that they will be exacerbated by the proposed action, and negatively impact the loach minnow.

The Forest Service has determined that suitable habitat for Chiricahua leopard frogs exists along the San Francisco River, which forms a small portion of the southeastern boundary of the Allotment. Suitable habitat may also be present in springs on the Allotment. No surveys have been completed, so there is no certainty that frogs occur on this Allotment. The Forest Service has concluded that there are 0.1 miles of suitable or potential habitat within the allotment (not including the springs), but that this habitat is inaccessible to grazing. Our concerns would therefore be limited to sediment transport off of the allotment into this suitable habitat and effects to frogs, if any, at springs within the Allotment.

Hickey Allotment

The Consultation Forms note that livestock do not have any direct access to occupied loach minnow habitat within the Allotment. Current and proposed grazing is within capacity calculations. According to the Forest Service, there are no perennial or intermittent drainages within grazed pastures (F. Hayes, pers. comm. 2003). The Service anticipates indirect effects to the San Francisco River from grazing in the upland areas. The proposed action will continue with 233 cow/calf units from 2003 to 2005 at utilization rates of 40 percent during the dormant season and 30 to 35 percent in the growing season on rangeland that has 88 percent impaired soils, range conditions at 15 percent poor and 83 percent fair, and riparian areas that are entirely functioning at risk (upward trend, 52 percent) or non-functional. We believe these conditions, combined with the action as proposed, will lead to a continuation of degraded conditions. Additionally, the FWS believes that the action as proposed is likely to adversely affect the loach minnow found within and downstream of Allotment boundaries, due the effects listed in the loach minnow section below.

The Forest Service has determined that suitable habitat for Chiricahua leopard frogs exists along the San Francisco River, which forms a small portion of the southeastern boundary of the Allotment. Suitable habitat may also be present in springs on the Allotment. No surveys have been completed. The Forest Service has concluded that there are 12.5 miles of suitable or potential habitat within the allotment (not including the springs), but that this habitat is largely inaccessible to grazing. The Forest Service further notes that springs used by livestock are mostly protected by fencing, but that a few remain unprotected. Our concerns would therefore be limited to sediment transport off of the allotment into this suitable habitat and effects to frogs, if any, at springs within the Allotment.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Environmental Baseline addresses many on-going actions, which are also considered to contribute to cumulative effects. These non-Federal actions are expected to continue during the life of the project.

The proposed action occurs largely within the Apache Sitgreaves National Forest, although some effects may result to areas downstream of the Forest boundary. This area is subject to a wide variety of uses as it flows through private, State, and Federal lands in and around the towns of Clifton and Morenci, including water pumping and use. Continued mining actions are reasonably likely to occur in and around Morenci. Additionally, it is reasonable to expect that there will be ongoing recreation along the San Francisco River by the general public. There are several public roads that cross the San Francisco River, including one primitive road in the river bottom from Clifton six miles upstream almost to the Forest Service boundary. This road will likely undergo continued use and maintenance.

Anglers commonly move fish, tiger salamanders, and crayfish among tanks and other aquatic sites to establish a fishery or a source of bait, or in some cases bait is released at an aquatic site during angling. Water, salamanders, or perhaps fish and crayfish could all be carriers of chytrids. In addition to possibly introducing chytrids, such activities would also facilitate introduction of nonnative predators with which the Chiricahua leopard frog cannot coexist.

Grazing occurs on private land inholdings on the A-S, and within portions of the allotments considered in this consultation. Grazing also occurs on private land parcels upstream of the allotments along the San Francisco River. Impacts from that grazing can and does influence stream conditions within the allotments under consultation. The effects of this grazing would be the same as those described for this consultation, and are additive to those effects occurring on federally-managed lands.

CONCLUSION

Spikedace

After reviewing the current status of the spikedace, the environmental baseline for the action area, the effects of the proposed reauthorization of livestock grazing on 16 allotments on the Alpine and Clifton Ranger Districts of the Apache National Forest, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of, or destroy or adversely modify designated critical habitat for, the spikedace within Complex 6. The changes made by the Forest Service to reduce the number of cattle and season of use on the Allotments on the Alpine Ranger District, combined with removal of cattle from the mainstem Blue and San Francisco rivers, has, in our opinion, removed the treat of jeopardy and adverse modification from the proposed action. In the Final Rule designating critical habitat for spikedace and loach minnow (USFWS 2000a), we noted that "Because of these species' precarious status, mere stabilization of spikedace and loach minnow at their present levels will not achieve conservation. Recovery through protection and enhancement of the existing populations, plus reestablishment of populations in suitable areas of historical range, are necessary for their survival." We conclude that, while there is no jeopardy or adverse modification, the proposed action will adversely affect the survival and recovery of spikedace for the following reasons:

- Spikedace are limited in distribution to 289 miles of stream in portions of the Gila River, lower San Pedro River, Aravaipa Creek, and Eagle Creek. They are likely still present, but appear to be in declining numbers, in the Verde River. Its present range is 10 to 15 percent of its historic range, and it is now only common in Aravaipa Creek and portions of the upper Gila River in New Mexico. Because of this limited range and distribution, habitat along the Blue and San Francisco rivers is essential to the survival, and particularly the recovery, of this species.

- The proposed action covers 279,681 acres which are in degraded riparian, range, and soil conditions. The FWS recognizes that, in part, these conditions are due to past actions. Conditions can be summarized as follows.

Table 11. Allotment conditions of concern for the proposed action of grazing on 16 allotments along the Blue and San Francisco rivers.

Allotment	Range	Soils	Riparian
Stone Creek	79 % poor/very poor	78% stable, 22% impaired	"poor condition"
Upper Campbell Blue	Varies from poor with an downward trend to good with a downward trend, and 50% of range does not meet Forest Plan standards.	50% of soils do not meet Forest Plan standards.	90% unsatisfactory
Turkey Creek	unknown	23% impaired; 50% unsuited	95% unsatisfactory
Bobcat-Johnson	unknown	28% stable; 4% impaired; 68% unsuited	66% unsatisfactory overall; 85% unsatisfactory on the Blue River
Foote Creek	64% very poor; 29% poor	70% stable; 29% impaired	unknown
Red Hill	78% very poor; 18% poor	94% stable; 6% unstable	50% functioning at risk with a downward trend
Bush Creek (verbal info. only)	Some very poor; some poor with a downward trend	Impaired or unsatisfactory	Poor
Fishhook-Steeple Mesa (2 Allotments)	Unknown	25% impaired; 56% unstable	60% unsatisfactory
Cow Flat	40% very poor; 34% poor	68% impaired	Unknown
KP	Unknown	56% stable; 20% impaired; 24% unsuited	75% unsatisfactory

Raspberry	Unknown	3% stable; 3% impaired; 94% unsuited	90% unsatisfactory
Pigeon	22% very poor;26% poor	25% impaired; 62% unstable	Functioning at risk, upward trend
Wildbunch	78% fair	12% impaired; 64% unsuited	87% functioning at risk, upward trend, 9% nonfunctioning
Sardine	72% poor	99.8% unstable	Unknown
Hickey	83% fair, 15% poor	88% impaired	52 % functioning at risk, upward trend; 48 % at non-functioning

The proposed action would continue grazing when the environmental baseline is degraded, and we believe continued grazing of this area will perpetuate current conditions or preclude or delay recovery. We are specifically concerned that utilization rates remain higher than suitable on areas that are already degraded. However, we believe the recent reductions in cattle numbers and seasons of use, combined with removal of the cattle from the mainstem Blue and San Francisco rivers, will prevent the proposed action from jeopardizing the continued existence of the fish, and will not result in adverse modification of critical habitat. We anticipate that some degradation will continue, as the on-going degradation in this area will take some time to slow, halt, and reverse to improvement of conditions.

Loach Minnow

For the reasons noted above under spikedace, we believe an analysis of the effects of the proposed action on Complex 6, in which the proposed action occurs, is appropriate. After reviewing the current status of the loach minnow, the environmental baseline for the action area, the effects of the proposed reauthorization of livestock grazing on 16 allotments on the Alpine and Clifton Ranger Districts of the Apache National Forest, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species or destroy or adversely modify its designated critical habitat within Complex 6. As noted above under spikedace, in the Final Rule designating critical habitat for spikedace and loach minnow (USFWS 2000a), the FWS notes that "Because of these species' precarious status, mere stabilization of spikedace and loach minnow at their present levels will not achieve conservation. Recovery through protection and enhancement of the existing populations, plus reestablishment of populations in suitable areas of historical range, are necessary for their survival." We believe that the action as proposed will adversely affect the survival and recovery of the species for the following reasons:

- Loach minnow are limited in distribution to 419 miles of stream. Where they were commonly found throughout much of the Gila River basin, Salt, San Pedro, and San Francisco subbasins, it is now commonly found only in Aravaipa Creek, the Blue River, and limited portions of the San Francisco, upper Gila, and Tularosa Rivers in New Mexico. It has been reduced in distribution to 15 to 20 percent of its historical range. Because of this limited range and distribution, habitat along the Blue and San Francisco rivers is essential to the survival, and particularly the recovery, of this species.

- The proposed action covers 279,681 acres which are in severely degraded riparian, range, and soil conditions. The FWS recognizes that, in part, these conditions are due to past actions. Conditions are summarized under conclusions for spikedace above, in Table 11.

The proposed action would continue grazing when the environmental baseline is degraded, and we believe continued grazing of this area will perpetuate current conditions or preclude or delay recovery. We are specifically concerned that utilization rates remain higher than suitable on areas that are already degraded. However, we believe the recent reductions in cattle numbers and seasons of use, combined with removal of the cattle from the mainstem Blue and San Francisco rivers, will prevent the proposed action from jeopardizing the continued existence of the fish, and will not result in adverse modification of critical habitat. We anticipate that some degradation will continue, as the on-going degradation in this area will take some time to slow, halt, and reverse to improvement of conditions.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

Mexican Spotted Owl

Mexican spotted owls occur over a five-state area in the United States, as well as in portions of Mexico. There is concern that Mexican spotted owl numbers may be continuing to decline. The proposed action could affect a small number of owls, and a small portion of their total range. After reviewing the current status of the Mexican spotted owl, the environmental baseline for the action area, and the anticipated effects of proposed livestock grazing activities, it is our biological opinion that the action as proposed would not jeopardize the continued existence of this species because it would affect a relatively small portion of their range and habitat. No critical habitat has been designated on the Apache National Forest, therefore none would be affected.

Chiricahua Leopard Frog

Although the Chiricahua leopard frog is known to be extant in the Blue River and, as recently as 1995, in the San Francisco River, grazing has been excluded along both of these rivers. The Chiricahua leopard frog occurs over a large area of eastern Arizona, western New Mexico and portions of northwestern Mexico. The proposed action directly affects ponds or springs and indirectly affects the

Blue and San Francisco rivers, which cumulatively make up a very small portion of the species' range. After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, and the anticipated effects of proposed livestock grazing activities, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Chiricahua leopard frog because if affects a small portion of the species oveall range, habitat, and numbers. No critical habitat currently exists, therefore none would be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined at 50 CFR 17.3 to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined at 50 CFR 17.2 as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to the multiple permittees, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require the Permittees to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Spikedace

The FWS does not anticipate that the proposed action will incidentally take any spikedace, as they have been extirpated from the Blue and San Francisco rivers for approximately 40 years.

Loach Minnow

Table 10, discussed above in effects of the action, details the potential effects of grazing on fish. The third column indicates how fish may be harmed or harassed by the proposed action. As detailed above in the Environmental Baseline, loach minnow have been collected within allotment boundaries on the Turkey Creek, Bobcat-Johnson, Red Hill, Bush Creek, Fishhook-Steeple Mesa, Cow Flat, Raspberry, Pigeon, Wildbunch, Sardine, and Hickey allotments. The number of fish captured in each survey effort has varied widely, from one to 90. The exact number of loach minnow within the Blue and San Francisco rivers is unknown, but occupancy has been established for these two rivers, as well as Campbell Blue Creek, within the proposed action area.

The FWS concludes that take will occur directly due to stream crossings within the Turkey Creek, Bobcat-Johnson, Red Hill, Bush Creek, Fishhook-Steeple Mesa, Cow Flat, Raspberry, Wildbunch, and Hickey allotments. This take will occur in the form of harm and harassment, through either injury or death to fish trampled or displaced by cattle during stream crossings. We further anticipate that take will occur due to the indirect effects of grazing and the subsequent adverse effects to the riverine habitat in which loach minnow live. This take will be in the form of harm, in that habitat will be modified or degraded in such a way as to result in death or injury by significantly impairing essential behavioral patterns such as breeding, feeding, and sheltering. The FWS anticipates incidental take of loach minnow will be difficult to detect for the following reasons: (1) dead or impaired individuals are difficult to find due to their small size and the potential for any carcasses to be carried downstream or to be scavenged; and (2) adequate surveys have not been completed, thereby preventing determination of the numbers of loach minnow in areas potentially affected by the proposed action. Therefore, the FWS defines incidental take in terms of habitat conditions, and uses surrogate measures to identify when take has been exceeded. We anticipate that take will occur throughout those portions of the Blue and San Francisco rivers and their tributaries included within the proposed action area. The authorized level of incidental take of loach minnow from the proposed action will be exceeded if any of the following conditions occur:

1. Cattle cross the Blue or San Francisco rivers outside of the designated crossing areas.

2. Cattle are not excluded from occupied loach minnow habitat.

3. Forage utilization objectives are exceeded, AND there is a decrease in ground cover OR channel stability decreases.

Utilization rates are a good surrogate measure for determining incidental take because: 1) they are easily measured; 2) they are clearly defined in the proposed action for each allotment; and 3) they relate to habitat conditions, as described above in Table 10.

Mexican Spotted Owl

Because no surveys have been completed for Mexican spotted owls on either the Pigeon or Wildbunch allotments, the exact number of owls potentially inhabiting these areas is unknown. We believe the presence of 905 acres of protected and restricted habitat and the presence of one PAC five miles away from the proposed action area are strong evidence that owls are likely to occur within the proposed action area. However, we are not able to conclude with reasonable certainty that owls are present. While we cannot anticipate take from the proposed action, it should be noted that the action is not in compliance with either the grazing guidance criteria or the Recovery Plan.

Chiricahua Leopard Frog

Historically, Chiricahua leopard frogs have been documented from aquatic habitat across the A-S. Along the Blue River, surveys for Chiricahua leopard frogs resulted in detections beginning in the 1970s and continuing into 2002. However, these surveys have not been regular or thorough. With respect to the Blue River system in its entirety, Chiricahua leopard frogs have been located as far north as the Jackson Box area, and as far south as Juan Miller Crossing. Chiricahua leopard frogs have also been located on the Upper Campbell Blue drainage. Multiple records exist throughout the upper third of the Blue River. The Blue River is a continuous system, with numerous tributaries. Additional sources of habitat throughout the proposed action area include stock tanks, ponds or lakes, and springs. Chiricahua leopard frogs can migrate for up to five miles (Seburn *et al*. 1997). Due to frog detections, the continuity and availability of habitat, and the dispersal abilities of the frog, the FWS concludes that it is likely that the Blue River is occupied.

With respect to the San Francisco River, Chiricahua leopard frogs are known to have occurred historically. They have not been reported in the mainstem of the San Francisco River in Arizona since 1995; however, surveys have not been thorough. Chiricahua leopard frogs are extant in the mainstem of the San Francisco River in New Mexico, and the Blue River is a tributary to the San Francisco River. As with the Blue River, the 1995 detections of frogs, the continuity and availability of habitat, confluence with the Blue River which is occupied, known occurrences of the frog in upstream portions of the San Francisco, and dispersal abilities of the frog leads us to conclude with reasonable certainty that the San Francisco River is occupied.

The occurrence of Chiricahua leopard frogs in portions of the project area is uncertain due to the lack of surveys, but documentation provided by the Forest Service and other sources of information lead us to conclude that Chiricahua leopard frogs are present on the Pigeon and Wildbunch allotments. The Stone Creek, Upper Campbell Blue, Turkey Creek, Bobcat-Johnson, Cow Flat, Fishhook-Steeple Mesa, KP, Raspberry, Hickey, and Sardine allotments are also likely to support frogs, as frogs have been found in these areas in the past, and no regular, repeated surveys have been completed recently. However, although some of these allotments are likely occupied, the lack of survey data does not allow us to conclude that take will occur. Given the presence of Chiricahua leopard frogs within the San Francisco River, and the Blue River, and the presence of suitable habitat within the action area, Chiricahua leopard frogs are likely to occur during the life of the project (up to 10 years), and throughout the proposed action area.

It is difficult to quantify the number of individual frogs taken because: (1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could change over time through immigration, emigration, and loss or creation of habitat; and (3) adequate surveys have not been completed to determine the numbers of Chiricahua leopard frogs in areas potentially affected by the proposed action. However, the FWS anticipates the following forms of take over the life of the project for the Pigeon and Wildbunch allotments only:

1. Direct mortality or injury of all frogs at all livestock tanks where maintenance activities result in significant disturbance at the tank (e.g., dredging or silt removal, major repair of berms) and frogs are present during the maintenance activity;

2. Direct mortality or injury through trampling, destruction of egg masses, small tadpoles, and metamorphosing frogs, and ingestion of small larvae and eggs at all stock tanks at which cattle have access to the tank from March through October; trampling and destruction of small tadpoles and overwintering frogs at all stock tanks where cattle have access from November through February;

3. Harm or harass of frogs at one locality (livestock tank, stream, or spring) due to unintentional introduction of chytridiomycosis resulting from cattle moving among frog populations or transport of water or mud from aquatic sites by ranch hands, or other activities associated with the grazing management program.

4. Harm or harass including lost productivity of Chiricahua leopard frogs due to loss of bankline and emergent cover at three Chiricahua leopard frog sites where cattle have access to banklines of occupied frog habitats. Harm due to sedimentation of pools or other forms of habitat degradation at three Chiricahua leopard frog sites where cattle are contributing to erosion in watersheds upstream of occupied Chiricahua leopard frog habitat.

5. Harassment of Chiricahua leopard frogs at three tanks due to unintentional movement of nonnative bullfrogs, fish, salamanders, or crayfish to a tank occupied by Chiricahua leopard frog.

6. Harassment of Chiricahua leopard frogs at three livestock tanks where cattle have access to the tank and fouling of the water occurs to such an extent that conditions become toxic to frogs.

Occupancy of suitable habitat by Chiricahua leopard frogs is dynamic. Discovery of new populations, recolonizations of extirpated sites, and extirpation of occupied sites are common occurrences with this species; therefore, we expect that over the life of this action, sites where take may occur (sites occupied by Chiricahua leopard frogs) will change across the allotments. The above anticipated take takes into account the dynamic nature of frog occupancy; thus, we do not believe reinitiation is needed whenever a new population of Chiricahua leopard frogs is found, or frogs in a stockpond are periodically absent.

If, during the course of the action, the amount or extent of the incidental take anticipated is exceeded for loach minnow or Chiricahua leopard frog, the Forest Service must reinitiate consultation with the AESO immediately to avoid violation of section 9. Operations must be stopped in the interim period between the initiation and completion of the new consultation if it is determined that the impact of the additional taking will cause an irreversible and adverse impact on the species, as required by 50 CFR 402.14(i). An explanation of the causes of the taking should be provided to the FWS.

EFFECT OF THE TAKE

Loach Minnow

In this biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the species. The FWS believes that take of the species will remain fairly high, and that critical habitat will continue to be adversely affected. However, we believe that the recent reductions in cattle numbers by the Forest Service will allow for a leveling off of individual fish losses and habitat decline over time.

Chiricahua Leopard Frog

In this biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the species. This is due primarily to the fact that Chiricahua leopard frogs occur over a large area of eastern Arizona, western New Mexico, and portions of northwestern Mexico, and the proposed action affects a very small portion of the species' range.

REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Loach Minnow

For most of the allotments under consideration in this opinion, there is a general lack of information on range and/or riparian conditions. The use of surrogate measures to determine when anticipated incidental take of loach minnow has been exceeded relies on baseline information against which to evaluate the effects of the proposed action. Additionally, the Forest Service has recently made changes to the number of cattle and/or season of use for many of these allotments. Our analysis of the effects of the action relies in part on the assumption that increased rest and decreased number of cattle will improve the allotments', and ultimately riparian, conditions, therefore, it is necessary to monitor to

determine whether or not these conditions do improve. Monitoring required under the following reasonable and prudent measures will be necessary to evaluate the effects of the proposed action and incidental take associated with those effects. In addition, where the Forest Service provided allotment specific information on problem areas, the FWS has developed allotment-specific reasonable and prudent measures.

Increased sediment resulting from degraded channel conditions on tributaries specific to an individual allotment cause indirect effects to fish habitat throughout the Blue and/or San Francisco rivers, as described within the Biological Opinion above. Although the proposed action under consultation is the additive effects of grazing on 16 allotments, allotment-specific reasonable and prudent measures are necessary to address on-the-ground conditions which may not be present in all portions of the proposed action area, but which contribute to the additive effects to the Blue and San Francisco rivers.

The following reasonable and prudent measures and terms and conditions are necessary and appropriate to minimize the effects of take of loach minnow.

1. Cattle crossings within the proposed action area shall minimize adverse impacts to loach minnow where possible.

The following terms and conditions are necessary to implement reasonable and prudent measure 1.

   a. Specific crossings will be designated by a journey-level fish biologist. Crossing widths will be defined and field marked. All cattle trailing will be confined to the defined area. Crossing widths will be coordinated with the AESO prior to use.

   b. A journey-level fish biologist will designate site and area of crossing prior to cattle movement, and will survey the designated crossing to determine quanity and quality of the affected habitat and species presence or absence prior to cattle movement.

   c. Livestock trailing will not occur between May 16 and August 1 to protect eggs and fry.

2. The Forest Service shall reduce take of loach minnow associated with the proposed action, by protecting occupied habitat.

The following term and condition is necessary to implement reasonable and prudent measure 2.

   a. The Forest Service shall exclude cattle grazing from streams and riparian areas with occupied loach minnow habitat.

   b. If utilization rates are exceeded and ground cover decreases or channel stability decreases, then cattle will be removed from the affected area and the AESO will be contacted within 10

working days. The AESO will determine if the information provided constitutes new information requiring reinitiation of formal consultation.

c. Within 60 days of the finalization of this Biological Opinion, the Forest Service shall provide written documentation to notify the AESO of the methodologies that will be applied in accomplishing this reasonable and prudent measure.

d. The Forest Service shall provide the AESO with all data collected within 90 days.

3. The Forest Service shall conduct necessary monitoring of the incidental take associated with this proposed action.

The following terms and conditions are necessary to implement reasonable and prudent measure 3.

a. Using standard approved Forest Service methodologies, the Forest Service shall complete the necessary measurement of utilization rates, ground cover, and channel stability during the same time period to determine that utilization rates are not exceeded, ground cover is maintained or increased, and channel stability is maintained or increased. Utilization, ground cover, and channel stability will be measured at cattle entry and exit. Initial ground cover measurements and channel stability will be completed by November 1, 2003.

b. Representative sites for ground cover and channel stability measurements will be determined following a field review. For ground cover sites, the emphasis will be on slopes leading to drainage channels. For channel stability sites, the emphasis will be on sites within or adjacent to the grazing activity. Sites selected and procedures to be used will be coordinated with the AESO by November 15, 2003.

Chiricahua Leopard Frog

The following reasonable and prudent measures are necessary and terms and conditions are appropriate to minimize the effects of the take of Chiricahua leopard frogs for the Wildbunch and Pigeon allotments. (The Forest Service has determined that the Pigeon and Wildbunch allotments are currently occupied, and therefore emphasis is being placed on tracking the species on these allotments).

1. The Forest shall take steps necessary to minimize take associated with maintenance of stock tanks.

The following term and condition implements reasonable and prudent measure number 1:

a. Occupancy of suitable habitats by Chiricahua leopard frogs is dynamic. As a result, species abundance and presence/absence may vary at different sites from year to year. The Forest

Service shall survey to protocol for quality of habitat and verify the presence of frogs in those areas of historical or present occupation and areas with suitable habitat by Spring 2004.

b. For remaining areas, before cattle entry, the Forest Service shall perform a visual survey for presence/absence of any frog species and suitability of habitat at all tanks. Where frogs are present, the Forest Service shall ensure compliance with Term and Condition 1a, completing baseline surveys to determine if the frogs present are Chiricahua leopard frogs.

c. Where Chiricahua leopard frogs are found, the Forest Service shall coordinate with the AESO to develop and implement a site specific plan to either: 1) forego maintenance; 2) salvage and temporarily hold frogs; 3) limit disturbance and work areas to the minimum practicable (i.e., leave stands of emergent vegetation in place, implement measures to minimize the likelihood of disease transmission); or 4) fence portions of the occupied pond or tank (portions may be left unfenced to allow some access by cattle). If frogs are salvaged, the Forest Service shall coordinate with appropriate parties (e.g. AGFD) and a qualified institution to be used for the temporary holding of the frogs. Spring associated tanks or ponds will be given emphasis for protection.

d. Water shall not be pumped or diverted from a site occupied by Chiricahua leopard frogs. If the Forest Service elects to pump or divert water, further consultation is needed.

e. Survey data will be provided to the AESO within 90 days of collection.

f. The Forest Service shall coordinate with the FWS in developing a long-term monitoring plan for repeated surveys by 2005. This will allow for completion of needed surveys an assessment of habitat suitability data that will be used in development of the long-term plan.

2. Personnel education programs and well-defined operational procedures shall be implemented to minimize the contamination of occupied Chiricahua leopard frog habitat by non-native species of the chytrid fungus.

The following terms and conditions are necessary to implement reasonable and prudent measure 2:

a. Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be moved among livestock tanks or other aquatic sites.

b. Where new or existing sites occupied by Chiricahua leopard frogs occur, water shall not be hauled to the site from another aquatic site or tank that supports leopard frogs, bullfrogs, crayfish, or fish.

c. Where new or existing sites occupied by Chiricahua leopard frogs exist within the proposed action area, the Permittees shall be required to clean any equipment, boots, etc. used at an

aquatic site with a 10 percent bleach solution, or allow such equipment, boots, etc. to dry thoroughly, before using the same equipment, boots, etc. at another aquatic site.

d. All ranch hands, construction personnel, and others implementing the proposed action shall be given a copy of these term and conditions, and informed of the purpose and need to comply with them.

3. The Forest Service shall take the necessary steps to minimize take associated with grazing of occupied habitat not currently excluded from livestock grazing.

a. The Forest Service shall survey to protocol for quality of habitat and with the presence of frogs in those areas of historical or present occupation and areas with suitable habitat by Spring 2004.

b. For remaining areas, before cattle entry, the Forest Service shall perform a visual survey for presence/absence of any frog species and suitability of habitat in drainages with potential habitat. If frogs are present, the Forest Service shall ensure compliance with Term and Condition 3a, completing baseline surveys to determine if the frogs present are Chiricahua leopard frogs.

c. Where frogs are found, the Forest Service shall coordinate with the AESO to develop a site specific plan to either: 1) show quantifiable evidence that habitat will be maintained; or 2) preclude grazing from the site.

d. Water shall not be pumped or diverted from a site occupied by Chiricahua leopard frogs. If the Forest Service elects to pump or divert water, further consultation is needed.

e. Survey data shall be provided by the Forest Service to the AESO within 90 days of collection.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: (480) 835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species.

Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Implement the spikedace and loach minnow survey protocol developed by ASU to obtain regular survey data on spikedace and loach minnow within Campbell Blue Creek and the Blue and San Francisco rivers.

2. Develop a long-term plan to determine how consistent, repeated survey efforts can be accomplished for spikedace and loach minnow and their habitat in the Blue and San Francisco rivers and Campbell Blue Creek.

3. Develop a monitoring program for some or all of the allotments on the Alpine to determine the effects of grazing reductions for use in future project planning and consultation.

4. Develop a strategy to regularly survey for suitable habitat and to survey existing suitable habitat for Chiricahua leopard frogs.

5. Conduct surveys for the Mexican spotted owls throughout suitable habitat in the action area.

6. Conduct studies of spotted owl prey base species to determine their habitat requirements and how these requirements are affected by grazing.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

This concludes formal consultation on the action outlined in the consultation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate the Forest Service's efforts to identify and minimize effects to listed species from this project. For further information please contact Mary Richardson (x242) or Debra Bills (x239). Please refer to the consultation numbers listed on the first page of this document in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Field Supervisor, New Mexico Ecological Services, Albuquerque, NM
District Ranger, Alpine Ranger District, Alpine, AZ
District Ranger, Clifton Ranger District, Clifton, AZ

Ms. Rose Coleman-Awtrey, Applicant, Blue, AZ
Mr. Jimmy Joy, Applicant, Blue, AZ
Mr. Darrill Wolkins, Applicant, Alpine, AZ
Mr. and Mrs. Robert and Wanda Gomez, Clifton, AZ
Mr. Glen McCarty, Reserve, NM
Mr. Dan Heap, St. Johns, AZ
John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

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APPENDIX A - Concurrences

The Forest Service requested concurrence for multiple species on the Pigeon, Wildbunch, Sardine, and Hickey allotments on the Clifton Ranger District. The information in this concurrence section does not apply to any of the allotments on the Alpine Ranger District. Concurrences were not sought for each of these species on all allotments, but can be summarized as follows:

Table 7. Summary of Concurrence Requests for Allotments on the Clifton Ranger District.

Species	Pigeon	Wildbunch	Sardine	Hickey
Southwestern Willow Flycatcher	X	X		X
Bald eagle	X	X		
Razorback sucker	X	X	X	X
Jaguar			X	X
Mexican gray wolf*	X	X	X	X
Lesser long-nosed bat			X	X
Arizona hedgehog cactus			X	X

*Concurrence is requested for a may affect, not likely to jeopardize determination for the Mexican gray wolf, as the population on the Apache National Forest has been designated experimental non-essential.

SOUTHWESTERN WILLOW FLYCATCHER

The Forest Service requested our concurrence with a may affect, not likely to adversely affect determination for southwestern willow flycatchers for the Pigeon, Wildbunch, and Hickey allotments. The BAE notes that surveys were conducted in 1995 and 1996 on the Blue River and Pigeon Creek and on the lower San Francisco River, respectively. These surveys indicated that no suitable habitat was present. A subsequent survey in 1999 noted that potential habitat existed in some of the drainages on the allotment, per the BAE. The Forest Service conducted additional surveys between May and July of 2002 and found that there are distinct and merged patches of vegetation along eight miles of the San Francisco River and along 10 miles of the Blue River which they consider as suitable (USDA 2002b). The nearest known flycatchers occur approximately 35 miles to the north of the Pigeon, Wildbunch, and Hickey allotments.

The Grazing Guidance Criteria (USDA 2002a) indicate that, to meet a determination of May Affect, Not Likely to Adversely Affect:

1) Livestock use will not occur within five miles of occupied habitat during the breeding season, or will not occur within two miles if cowbird trapping and monitoring or an approved cowbird research program is in place.
2) Livestock grazing in unoccupied suitable habitat will not reduce the suitability, nor reduce the likelihood of suitable habitat to expand to the site's potential.
3) No livestock grazing will occur in potential habitat.
4) Subwatershed condition in the presence of livestock grazing will be maintained or improved and indicators of watershed health and TEP species habitat demonstrate that effects will be insignificant or discountable.

The first criterion is met, in that the nearest known flycatchers are approximately 35 miles away. With respect to the second and third criteria, livestock grazing will not occur within suitable or potential habitat. Suitable and potential habitat is located along the Blue and San Francisco rivers, and the Forest Service has already committed to the exclusion of grazing from the mainstem Blue and San Francisco rivers.

With respect to the fourth criterion, the Forest Service has taken steps to minimize the effects of grazing on the subwatershed. The Pigeon Allotment is currently stocked at 38 percent of its previous permitted cow/calf units, while Wildbunch is at 65 percent, and Hickey is at 33 percent. Additionally, the Hickey Allotment received total rest between 1993 and 1999 (USDA 2002c).

The Forest Service has developed a list of management recommendations for the flycatcher (USDA 2002b). They include completion of avian surveys and surveying of potential habitat as it becomes suitable. The FWS is providing concurrence with a may affect, not likely to adversely affect determination for southwestern willow flycatcher on the Pigeon, Wildbunch, and Hickey allotments contingent upon the following conditions:

1. The Forest Service adopt its own management recommendations to complete additional flycatcher surveys to protocol in suitable habitat, as well as in those areas currently classified as potential habitat once they have reached suitable habitat status;
2. The Forest Service monitors the condition of riparian areas to ensure that criterion 4 of the Grazing Guidance Criteria (USDA 2002b) continues to be met (i.e., subwatershed conditions in the presence of livestock grazing will be maintained or improved).

BALD EAGLE

The Forest Service requested our concurrence with a may affect, not likely to adversely affect determination for bald eagles for the Pigeon and Wildbunch allotments. The BAE notes that no formal surveys have been conducted on the Allotment to detect breeding bald eagles or location of roost sites. Breeding birds are known to occur at Becker Lake near Alpine and at Luna Lake near Alpine. Becker Lake is approximately 60 miles north and west of the northern boundary of the Pigeon and Wildbunch allotments, while Luna Lake is approximately 35 miles north.

The BAE notes that bald eagles are common winter visitors along the Blue and San Francisco rivers, and that eagles probably roost along the Blue and San Francisco rivers or within the upland areas of these allotments. Additionally, the BAE notes that potential nest sites occur along both rivers and other perennial drainages within the Pigeon and Wildbunch allotments. A description of soil, range, and riparian conditions is provided in the biological opinion above. Those conditions constitute the baseline for this concurrence as well, but will not be reiterated here. The Consultation Forms note that no bald eagles have been detected by Forest Service personnel during routine administration of these allotments.

The grazing guidance criteria for bald eagle conclude that an action may affect, but is not likely to adversely affect bald eagles if:

1. Livestock grazing that occurs in the riparian areas is not reducing long-term roost and nesting tree regeneration, and

2. Livestock management activities (beyond presence of livestock) that occur within 0.25 miles of a bald eagle roost or nest site do not constitute a disturbance to the eagle(s).

The Consultation Forms indicate that, because both the Blue and San Francisco river systems on the Pigeon and Wildbunch allotments, as well as Pigeon Creek on the Pigeon Allotment, are excluded from livestock grazing, and because utilization standards will be applied on both allotments, the Forest Service does not anticipate that long-term roost and nesting tree regeneration will not be reduced. The FWS believes that riparian areas that are rated as *Functional at Risk* would benefit from a lower utilization standard than the proposed 40 percent that will occur on some portions of the allotment. The lack of large trees in many of the reaches that were assessed indicates that roost sites are limited for bald eagles

in this system. Regeneration of vegetation to a size class capable of providing adequate roost sites for bald eagles will take many years.

With respect to the second criteria, a determination of may affect not likely to adversely affect is appropriate if livestock management activities that occur within 0.25 miles of a bald eagle roost or nest site do not constitute a disturbance to the eagle(s). At this time, the Forest Service does not know if roost sites for bald eagle exist.

Because of the potential for wintering bald eagles to occur along the San Francisco River, and the lack of surveys, the FWS is only able to provide concurrence with the following condition, which is in compliance with the grazing guidance criteria. The FWS is providing concurrence with a may affect, not likely to adversely affect determination for bald eagle on the Pigeon and Wildbunch allotments contingent upon the following condition:

- If any livestock management activities, including placement of salt, water, or corrals, loading or unloading of cattle, use of mechanized equipment, or other activities that would create noise disturbances, should occur along Pigeon Creek, Turkey Creek, or HL Creek, or other drainages of similar size, the Forest Service will first determine that no bald eagle roosts occur within 0.25 miles of the proposed management activities.

RAZORBACK SUCKER

Razorback suckers have not been historically documented in the San Francisco River basin. Razorback suckers are known historically from most of the Gila River drainage, and may have been common upstream nearly to the New Mexico border (USFWS 1998). Razorback may have been present at the Gila/San Francisco rivers confluence.

Beginning in 1981 and continuing until 1989, 778,000 razorback suckers were stocked in the Gila River both up and downstream of the San Francisco River confluence. Additionally, 167,000 razorback suckers were introduced to the Blue River in the late 1980s. No razorbacks have been recaptured from the Blue River since 1987. The Consultation Forms note that no razorbacks were captured during survey work completed in portions of the lower Blue River between 1994 and 1998. By agreement with the FWS, the Forest Service considers the Blue River and those portions of the San Francisco River downstream from the Blue River to be occupied by introduced razorback suckers. The BAE notes that, for purposes of section 7 consultation, the Forest Service considers the San Francisco River to be occupied by relict individuals from the re-stocking effort beginning approximately one mile downstream from the western boundary of the neighboring Pleasant Valley Allotment. No critical habitat has been identified within the allotment boundaries (USFS 2001a).

The Forest Service has excluded the Blue and San Francisco rivers from cattle grazing. The Consultation Forms for the Pigeon Allotment note that drainages on that allotment do not provide

suitable or potential habitat for razorback suckers as none of the streams are large enough for them. The Forest Service concludes that nowhere within the allotment are conditions suitable or potentially suitable for razorback suckers. The Forest Service reached similar conclusions are presented for the Wildbunch Allotment, noting that drainages within the Wildbunch Allotment are not large enough to support razorback suckers. Similar conclusions are presented for the Sardine and Hickey allotments as well.

The Consultation Forms note that upland conditions (i.e., edaphic, vegetative, etc.) on the allotment may qualitatively and quantitatively impact aquatic and riparian habitats in the Blue and San Francisco rivers. They note further that livestock grazing on the Allotment in turn impact edaphic and vegetative characteristics of the watershed and thus, indirectly, impact aquatic habitats in the Blue and San Francisco rivers adjacent to, and downstream of, the allotment. The Consultation Forms further note that existing watershed and soil conditions on the allotment likely contribute to the observed hydrographs that appear incompatible with maintaining razorback suckers in the Blue and San Francisco River.

The BAE concludes that take is not likely to occur directly or indirectly because if any razorback suckers are present in the San Francisco River, they exist where habitat is suitable to permit their survival as individuals, and that conditions do not exist for successful reproduction or persistence of the species. This argument is not, in itself, sufficient to justify a finding of not likely to adversely affect. Any change in habitat condition that adversely affects an individual razorback sucker can constitute incidental take. There is no requirement that the population be self-sustaining within the action area.

A determination of "may affect, not likely to adversely affect" indicates that effects on listed species are expected to be discountable, insignificant, or beneficial. Insignificant effects relate to the size of the impact. Discountable effects are those effects which are extremely unlikely to occur, or are not able to be meaningfully measured, detected, or evaluated. The level of either insignificant or discountable effects must be such that no take, direct or incidental, is likely to occur. The size of the razorback sucker population in the San Francisco river is unknown, but is likely to be very small. This reduces the risk of death or injury to an individual occurring as a result of livestock grazing on the allotment to a very slight risk. The degree of risk to individuals and habitat potentially caused by the proposed action qualify as insignificant. The effects are also discountable, because they are very unlikely to occur (due to the low population levels) and are not able to be meaningfully measured. For these reasons, the FWS concurs with the Forest Service's determination of not likely to adversely affect for the Pigeon, Wildbunch, Sardine, and Hickey allotments.

MEXICAN GRAY WOLF

Historically, Mexican gray wolves were found in the eastern and central portions of Arizona. Wolves were known to occur on the Coronado National Forest, and on portions of the Apache National Forest as well. Wolves are most commonly associated with Madrean evergreen forests and woodlands, including pine, oak woodlands, pinyon-juniper forests, riparian areas, and grasslands above 4,500 feet. Mexican gray wolves were extirpated from the wild in the U.S. by private and government control

campaigns, and were listed as an endangered species in 1976. It is generally believed that naturally-occurring Mexican gray wolves no longer inhabit the United States (McBride 1980, Hoffmeister 1986).

A recovery plan, developed in 1982, recommended re-establishment of a wild population and maintenance of a captive population of wolves (USFWS 1982). Wolves were reintroduced on the Apache National Forest in March 1998. Reintroduced wolves are designated as an experimental non-essential population under the Act, which allows for greater management flexibility than would be possible if the wolves were classified as fully endangered. There are approximately 30 wolves in the wild at this time.

Since resident Mexican gray wolves, other than reintroduced wolves, are no longer believed to occur in the United States, there will be no direct effects to naturally occurring wolves from the proposed action and the numbers and reproduction of naturally occurring wolves will not be affected. Introduced wolves may be disturbed when proposed activities occur in areas they occupy. The BAE notes that this disturbance is anticipated to be of short duration. The proposed activities will likely result in the modification of historic wolf habitat and habitat of its prey species. Wolves prey on various species, some of which prefer open habitat and others that prefer dense habitat. Because of this, project implementation will benefit some prey species while negatively affecting others.

The Blue Range Wolf Recovery Area includes all of the Apache National Forest, and is divided into primary and secondary recovery zones. The Pigeon, Wildbunch, Sardine, and Hickey allotments are all within the recovery zones. No wolves are known to range within the Pigeon and Wildbunch allotments at this time. A pack of wolves was released in Turkey Creek within the Allotment, but that pack has since been recovered and released in New Mexico. No wolves are known to exist on the Sardine or Hickey allotments. However, as additional wolves are released and natural colonization occurs there is the opportunity for wolves to occur in this portion of the Apache-Sitgreaves National Forests, especially for foraging.

While no wolves are known to range within the allotment, it is possible that natural colonization from the experimental population could occur there. The BAE notes that cover, travel corridors, and denning areas are not limiting factors within the allotment. It is possible that the action could result in a declining prey species population, and the BAE notes that the loss of the herbaceous understory, from both successional trends in all habitats as well as ineffective livestock management, most likely has contributed to declining habitat conditions for most prey species.

Because of their status as an experimental, non-essential population, wolves found in Arizona are treated as though they are proposed for listing for section 7 consultation purposes. By definition, an experimental non-essential population is not essential to the continued existence of the species. Therefore, no proposed action impacting a population so designated could lead to a jeopardy determination for the entire species. Therefore, the FWS concurs with the Forest Service's determination of "not likely to jeopardize" the continued existence of the species.

JAGUAR

Minimal information was presented within the Consultation Forms for this species. However, it is known that no jaguars have been documented within the vicinity of the Sardine Allotment since the 1970s. Riparian corridors such as those along the Santa Cruz, Sardine, Woods Canyons, and the San Francisco River provide the greatest opportunity for movements by this species through the Sardine and Hickey allotments.

The grazing guidance criteria developed for the jaguar and a may affect not likely to adversely affect determination require that livestock grazing does not occur in areas where the jaguar has been sighted since 1970; that normal livestock activities within the riparian area do not reduce cover; and that potential movement corridors are not permanently disrupted by management programs. With respect to the Sardine Allotment, all of these criteria are met. As stated previously, no jaguars have been documented in this area since the 1970s. Additionally, the major riparian corridors through the allotments, in Lower Sardine Canyon and along the San Francisco River, are excluded from grazing, per the Consultation Forms. No potential movement corridors would be disrupted. Based on this information and the grazing guidance criteria, the FWS concurs with the Forest Service's determination of may affect, not likely to adversely affect.

LESSER LONG-NOSED BAT

According to the Consultation Forms, general bat surveys conducted on the Clifton Ranger District have not located this species, however, methodologies used may not have been adequate to detect the species. Within the Allotment boundaries, suitable habitat for lesser long-nosed bat may occur in grassland, browse, chaparral, and riparian vegetation communities within the allotment. However, as noted in the BE, the nearest known roost location for lesser long-nosed bats is approximately 90 miles to the southwest in the Pinaleño Mountains, and the proposed project area is outside the range of the species. While both *Agave palmeri* and *A. schotti*, which serve as primary and incidental food sources for lesser long-nosed bat, are found on the allotment, they are not found in any concentrated areas, and are likely widely dispersed and small in size. For these reasons, the FWS concurs with the Forest Service's determination of may affect, not likely to adversely affect lesser long-nosed bats.

ARIZONA HEDGEHOG CACTUS

Initially, the Forest Service determined that the proposed action was likely to adversely affect Arizona hedgehog cactus, and requested formal consultation. Since that time, additional genetic studies have determined that this species does not occur outside of the original type locality. Therefore, those cacti previously protected as the listed Arizona hedgehog cactus are no longer considered to occur on the Allotment (Baker 2001). For this reason, no concurrence is required for this species.

APPENDIX B-Figures

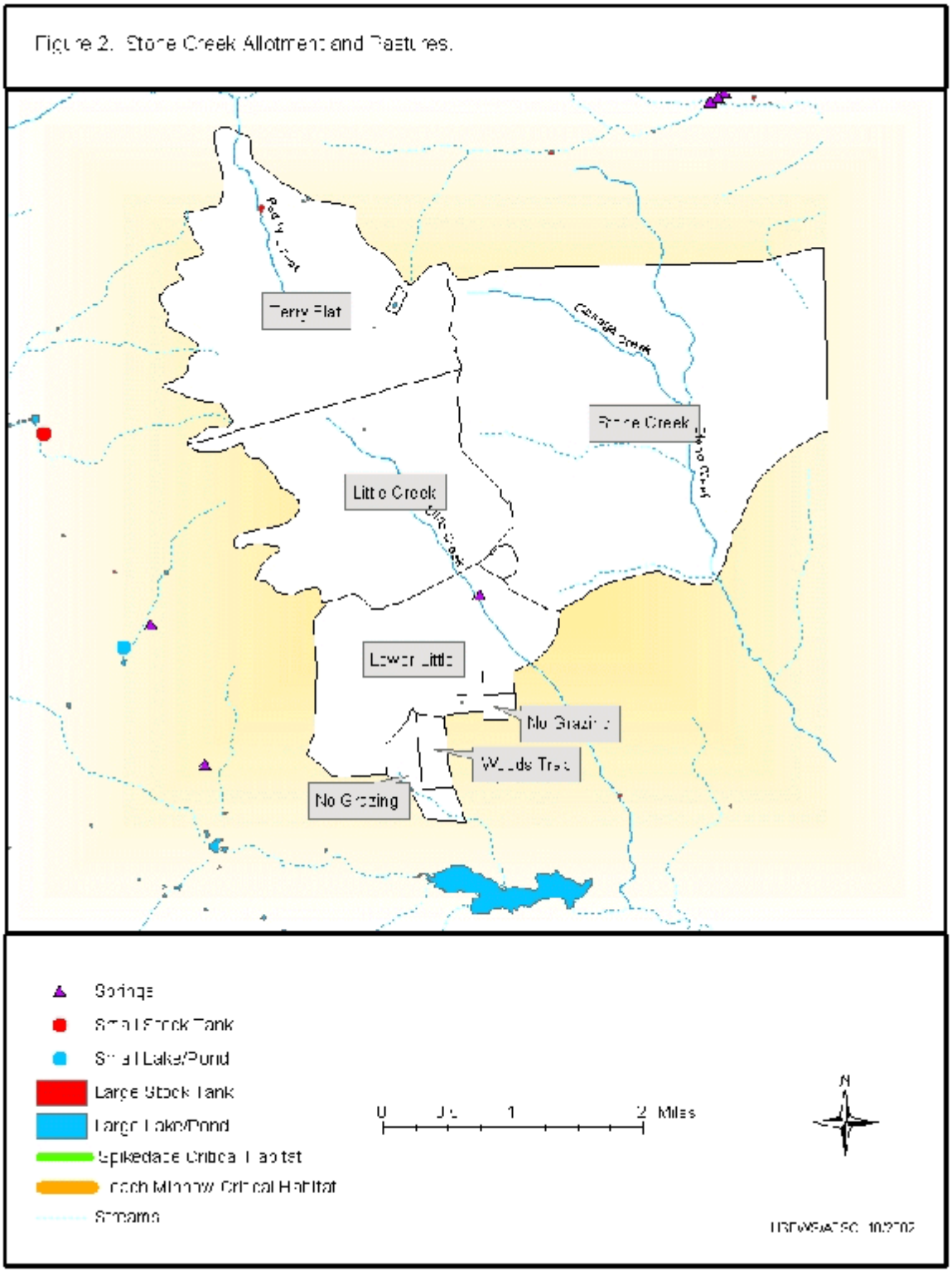
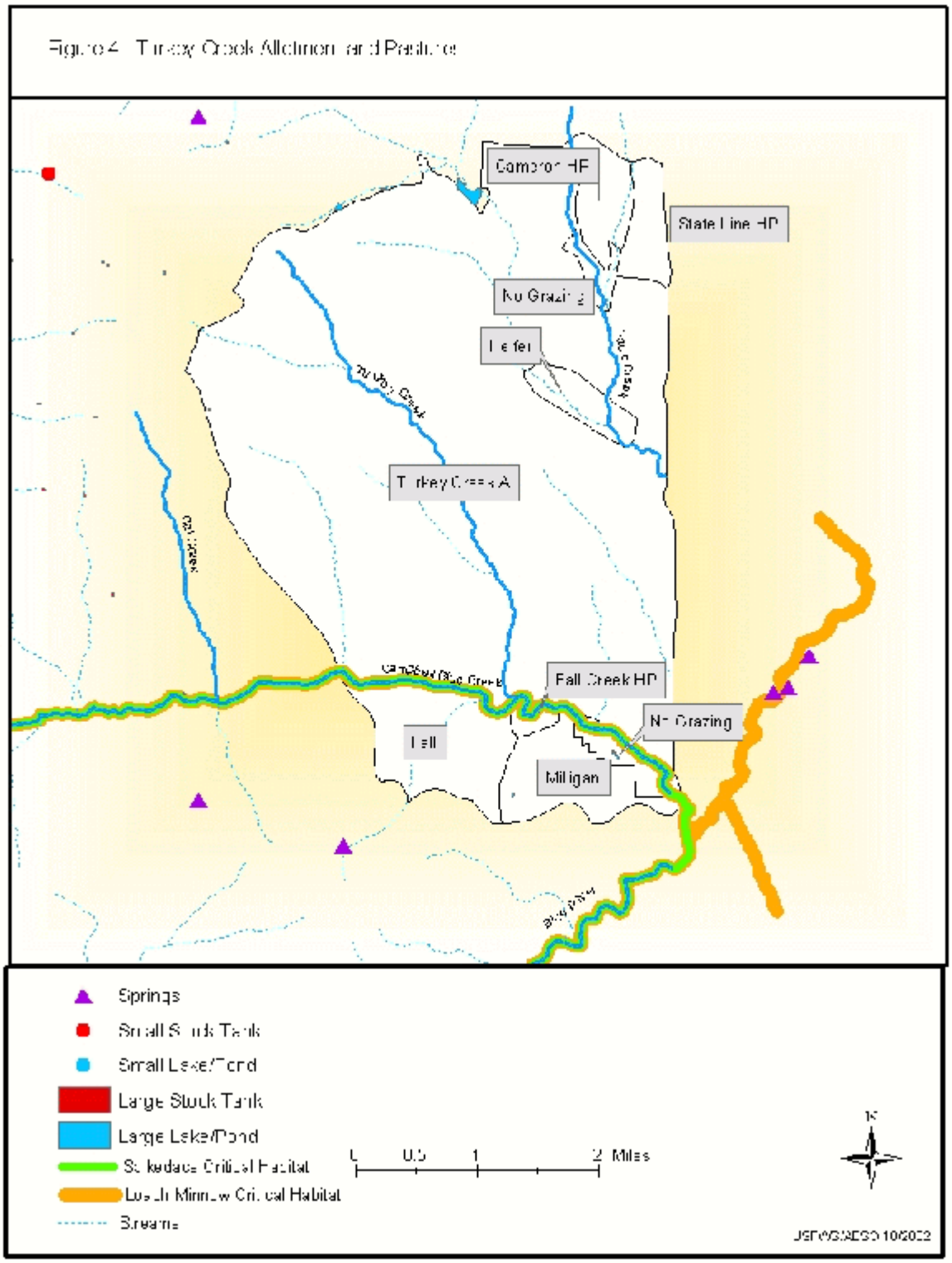
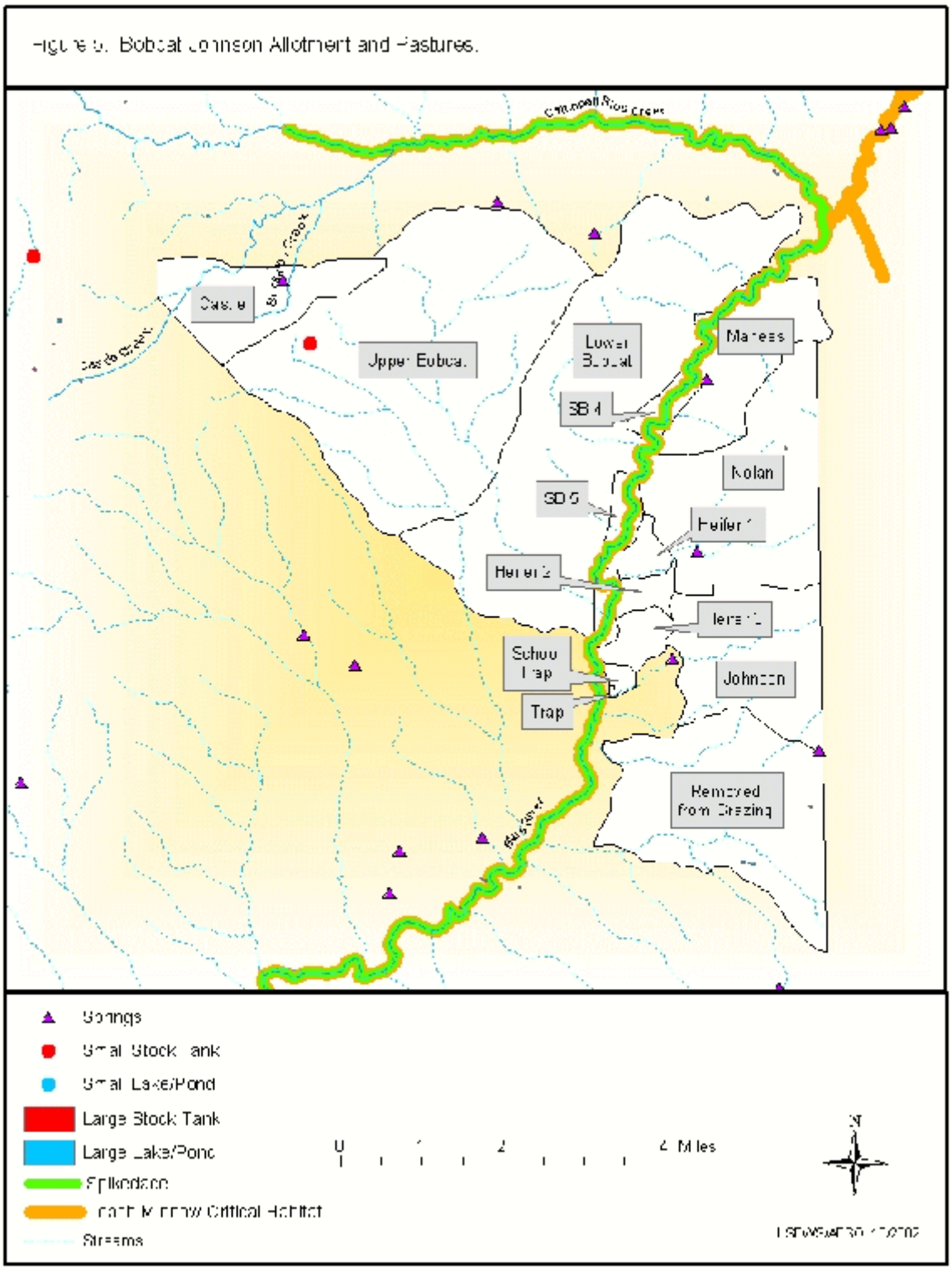


Figure 2. Stone Creek Allotment and Pastures.
Terry Flat
Stone Creek
Little Creek
Lower Little
No Grazing
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Streams
0
1
2 Miles
N


Cameron HF
State Line HP
No Grazing
Fall Creek HP
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Streams
Miles


Upper Bobcat
Lower Bobcat
Maness
SBH
Nolan
SDG
Johnson
Trap
Springs
Large Stock Tank
Large Lake/Pond
Streams
4 Miles
N

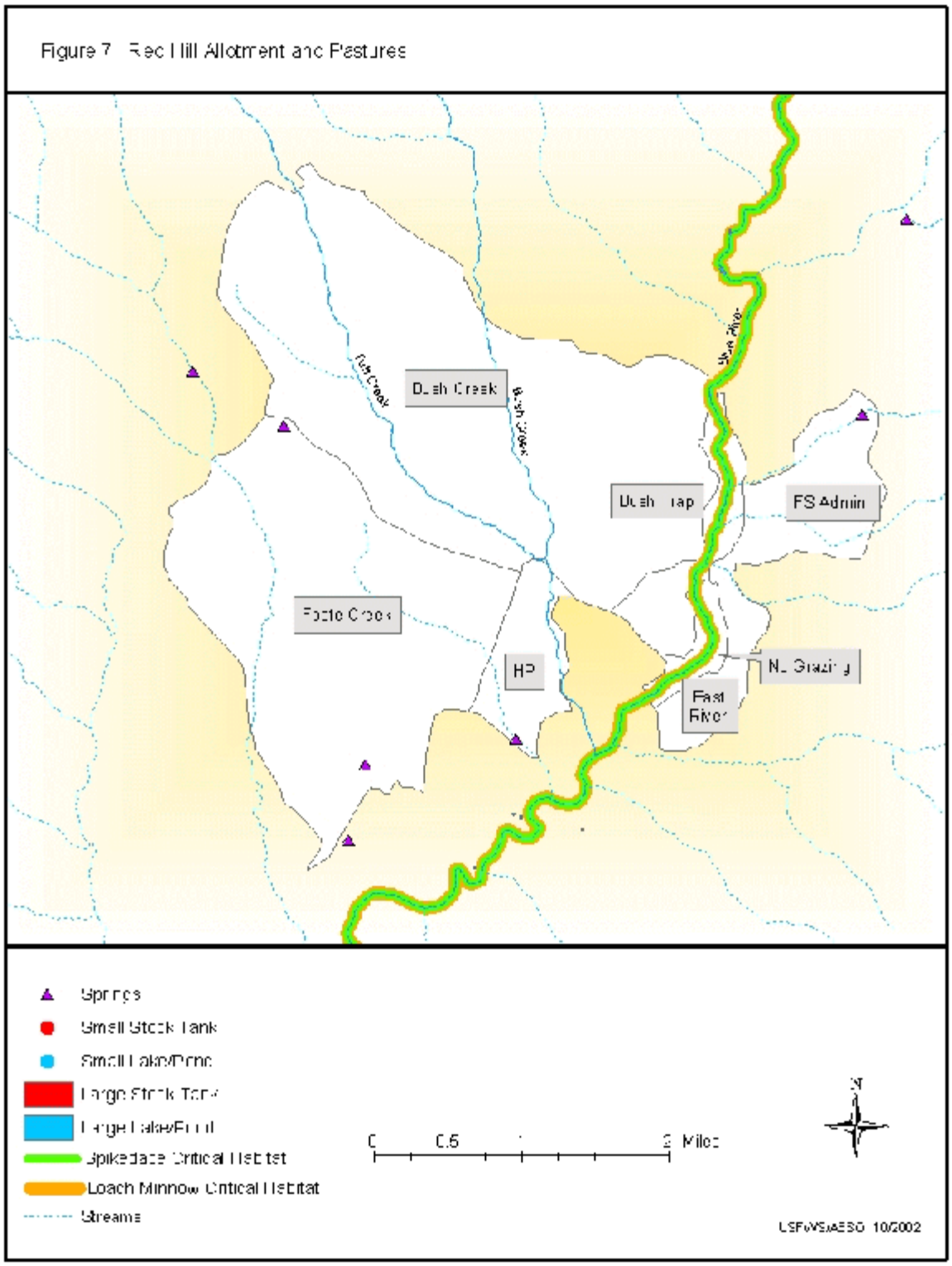


Figure 7 Rec Hill Allotment and Pastures
Dash Creek
FS Admin
HP
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Spikedace Critical Habitat
Loach Minnow Critical Habitat
Streams
0
0.5
1 Miles
N
USFWS/AESO 10/2002

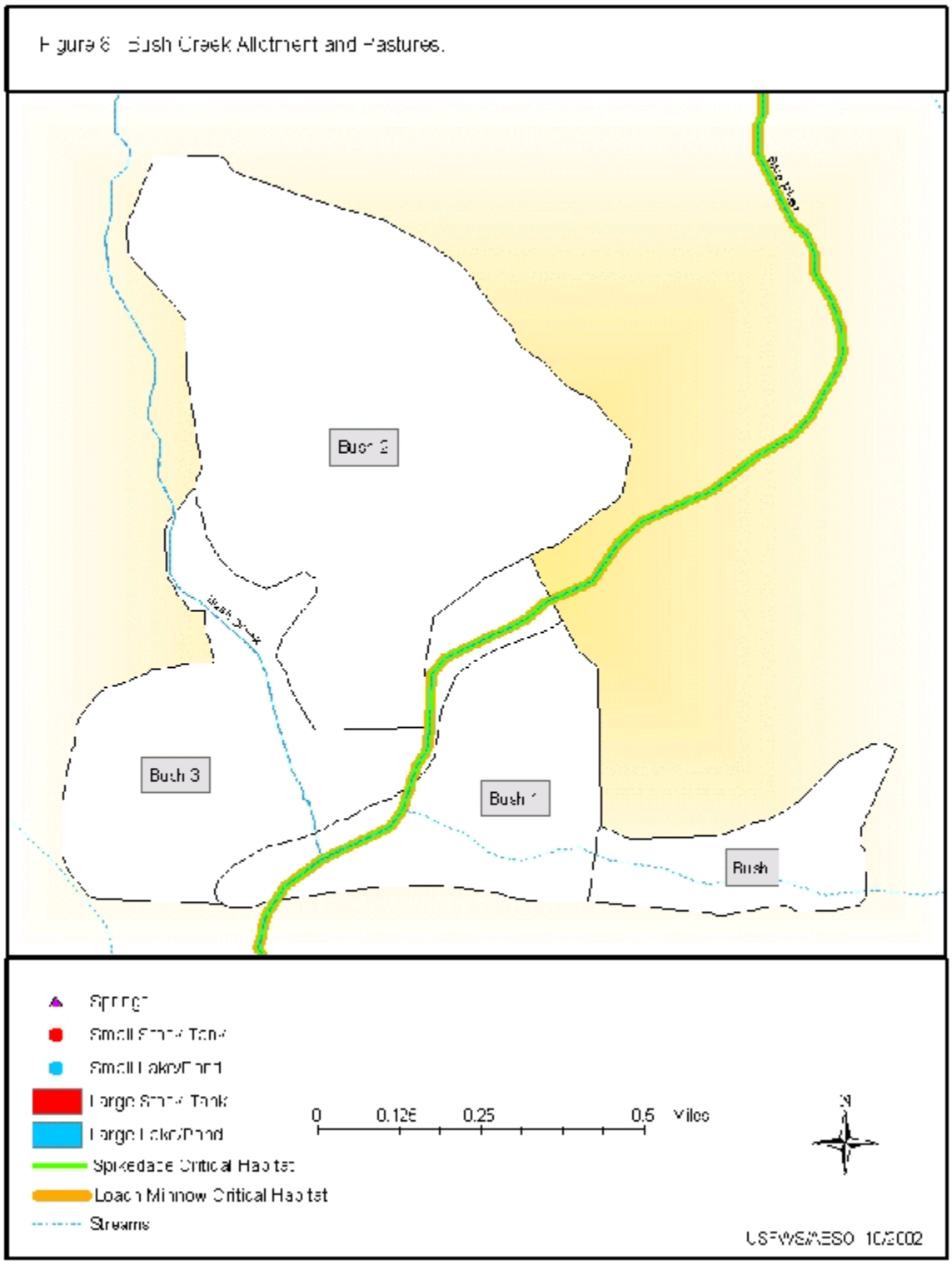
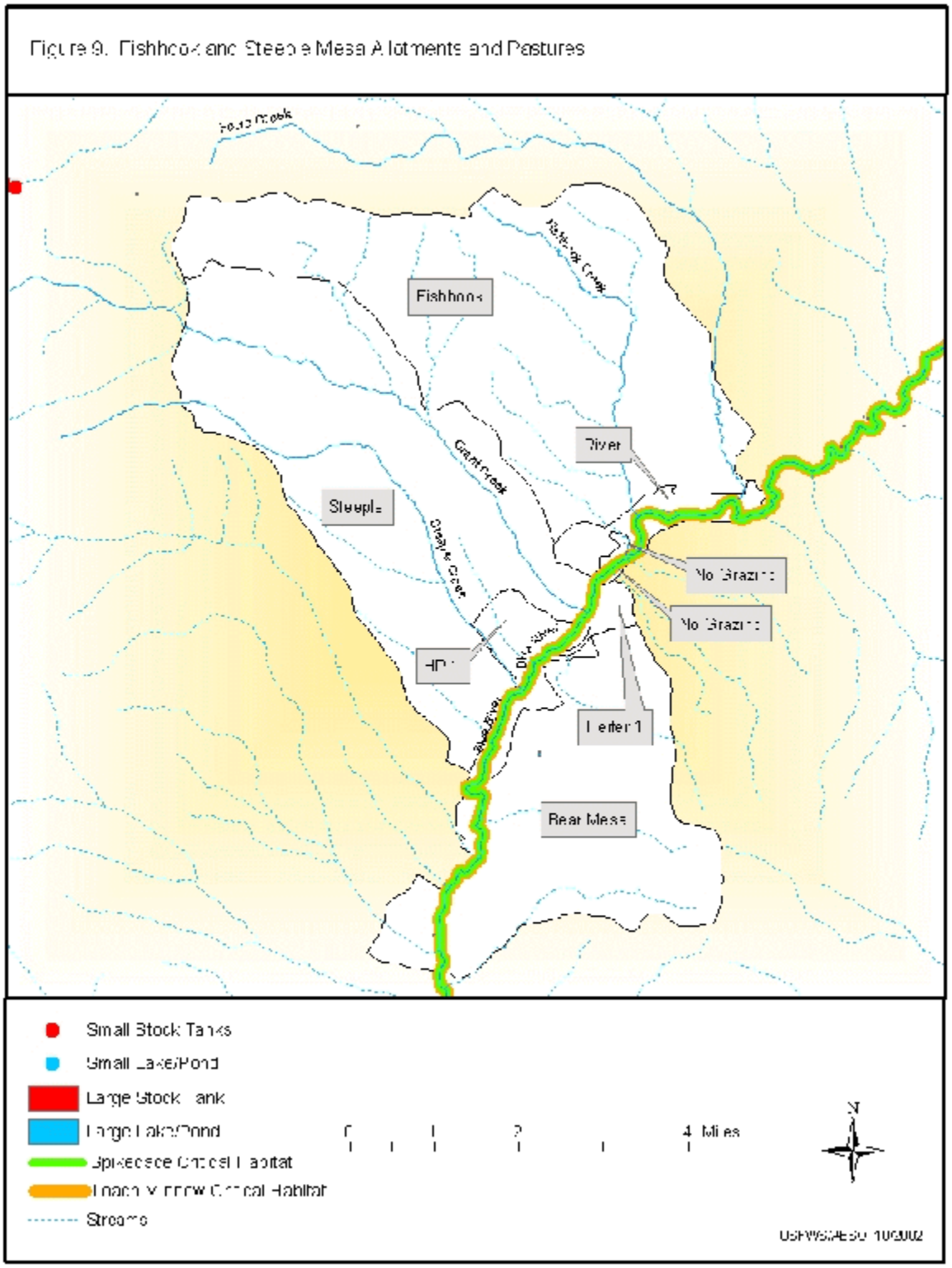


Figure 6 Bush Creek Allotment and Pastures.
Bush 2
Bush 3
Bush 1
Bush
Spring
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Spikedace Critical Habitat
Loach Minnow Critical Habitat
Streams
0 0.125 0.25 0.5 Miles
N
USFWS/AESO 10/2002


Fishhooks
Sleeple
River
No Grazing
No Grazing
Bear Mesa
Small Stock Tanks
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Streams
4 Miles
N

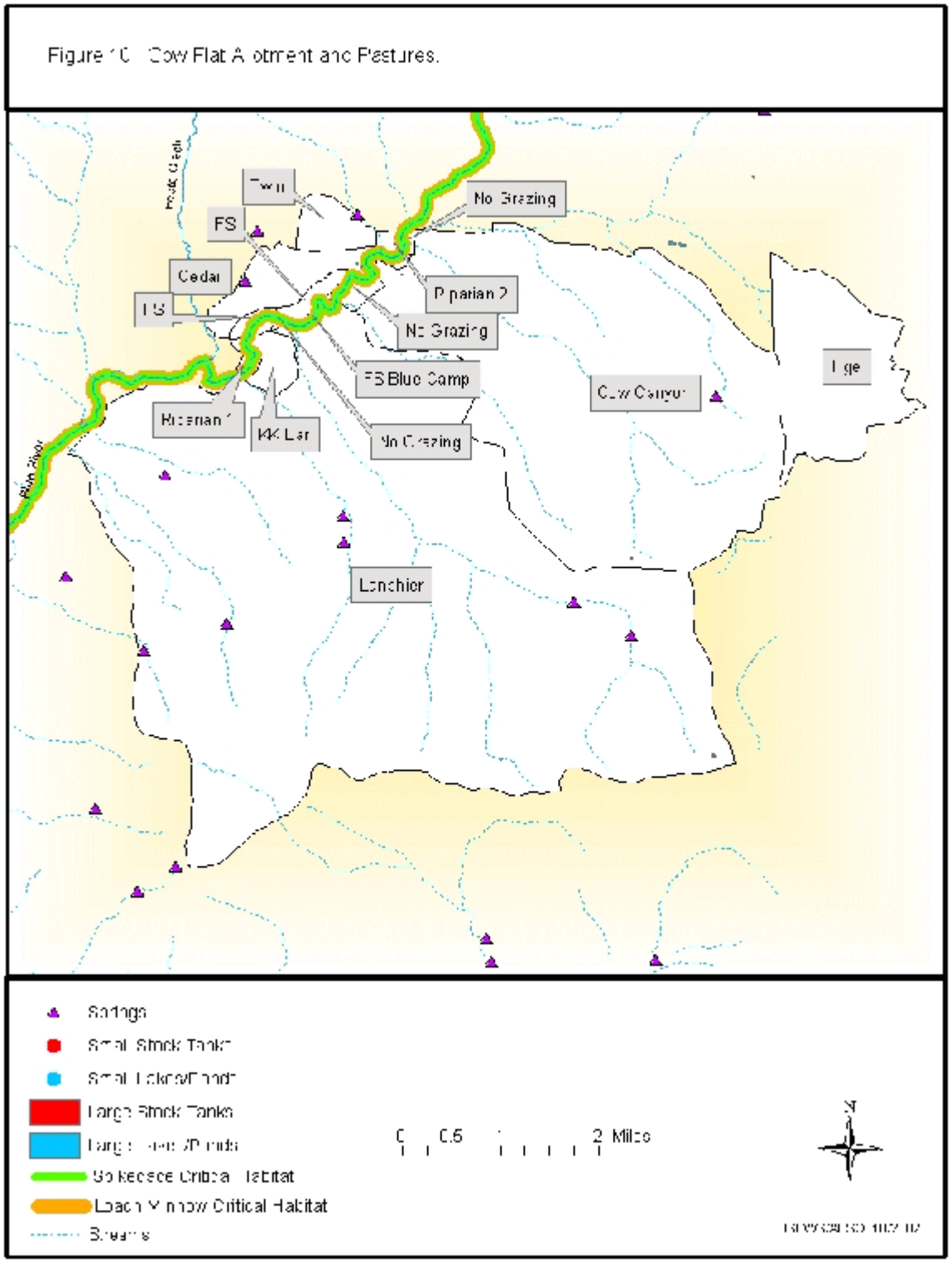


Figure 10 Cow Flat Allotment and Pastures.
Twin
No Grazing
FS
Cedar
Riparian 2
No Grazing
FS Blue Camp
Cow Canyon
Ridge
Riparian 1
KK Lar
No Grazing
Lonchier
Springs
Small Stock Tanks
Small Lakes/Ponds
Large Stock Tanks
Large Lakes/Ponds
Bonneville Cutthroat Habitat
Lahontan Cutthroat Critical Habitat
Streams
0 0.5 2 Miles
N

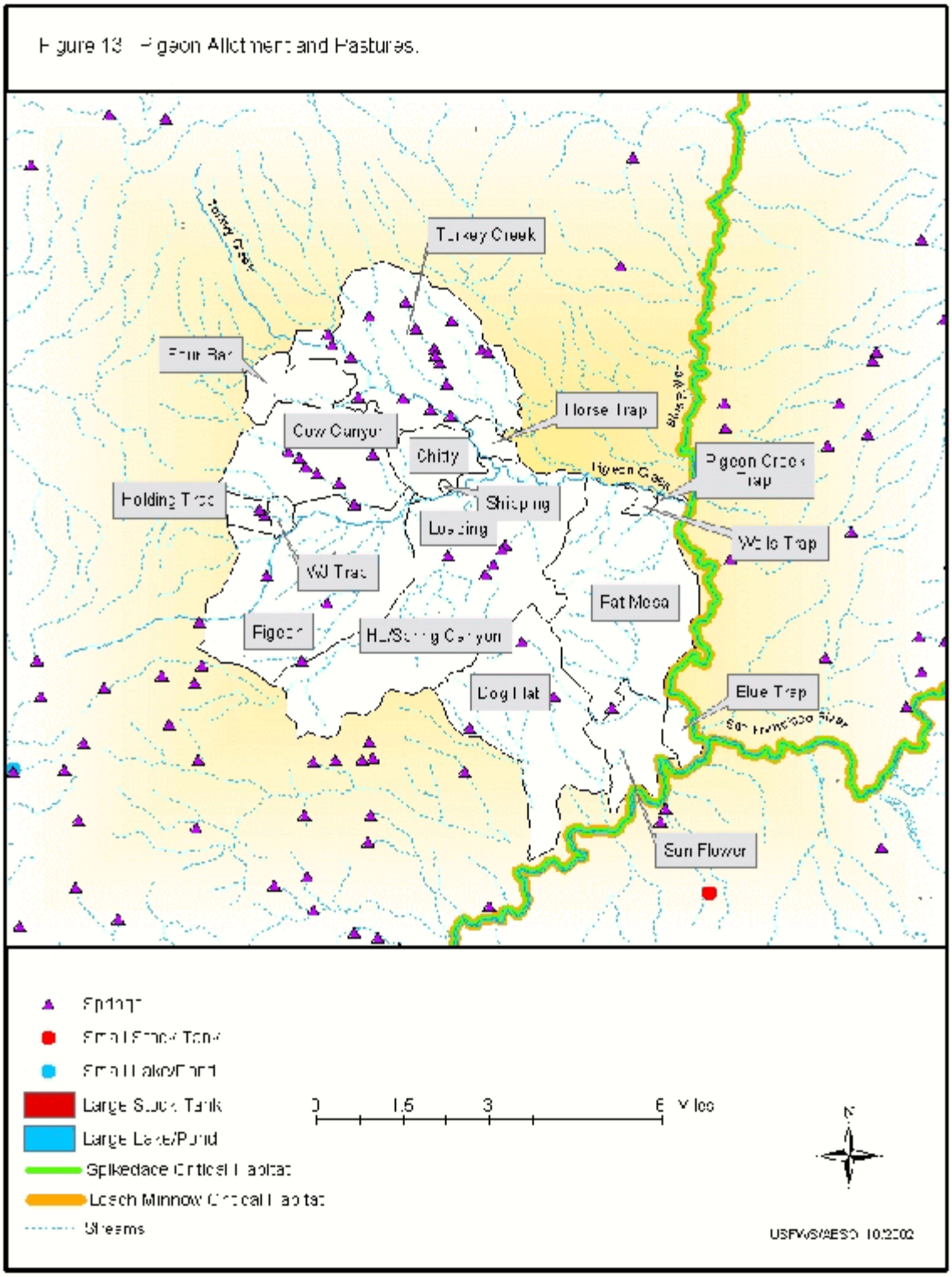


Figure 13 Pigeon Allotments and Pasture.
Turkey Creek
Four Bar
Cow Canyon
Chitty
Holding Trap
Shipping
Lambing
WJ Trap
Figure
Horse Trap
Pigeon Creek Trap
Wells Trap
Fat Mesa
Dog Flat
Blue Trap
Sun Flower
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Spikedace Critical Habitat
Loach Minnow Critical Habitat
Streams
0 1.5 3 6 Miles
N
USFWS/AESO 10/2002

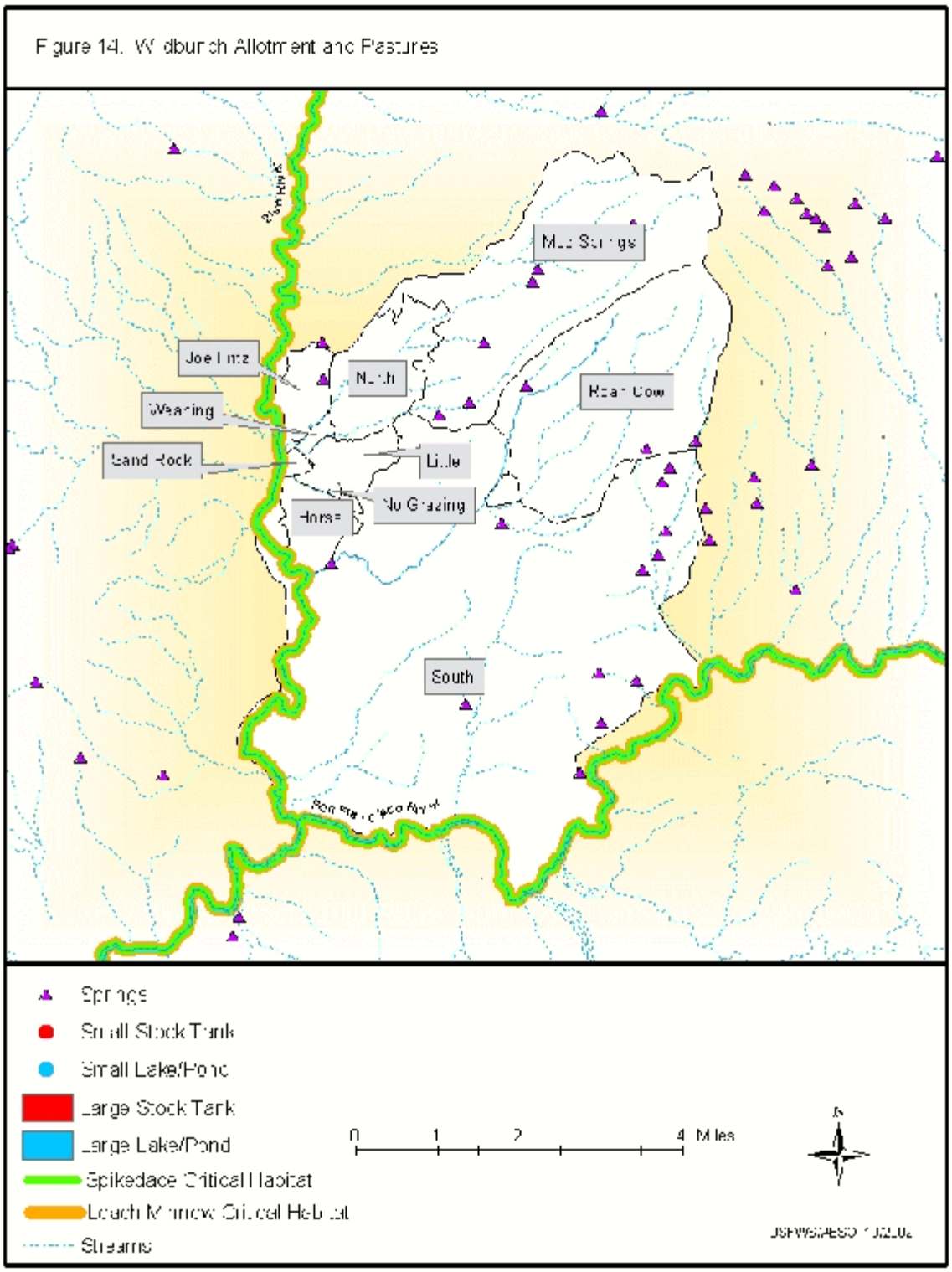
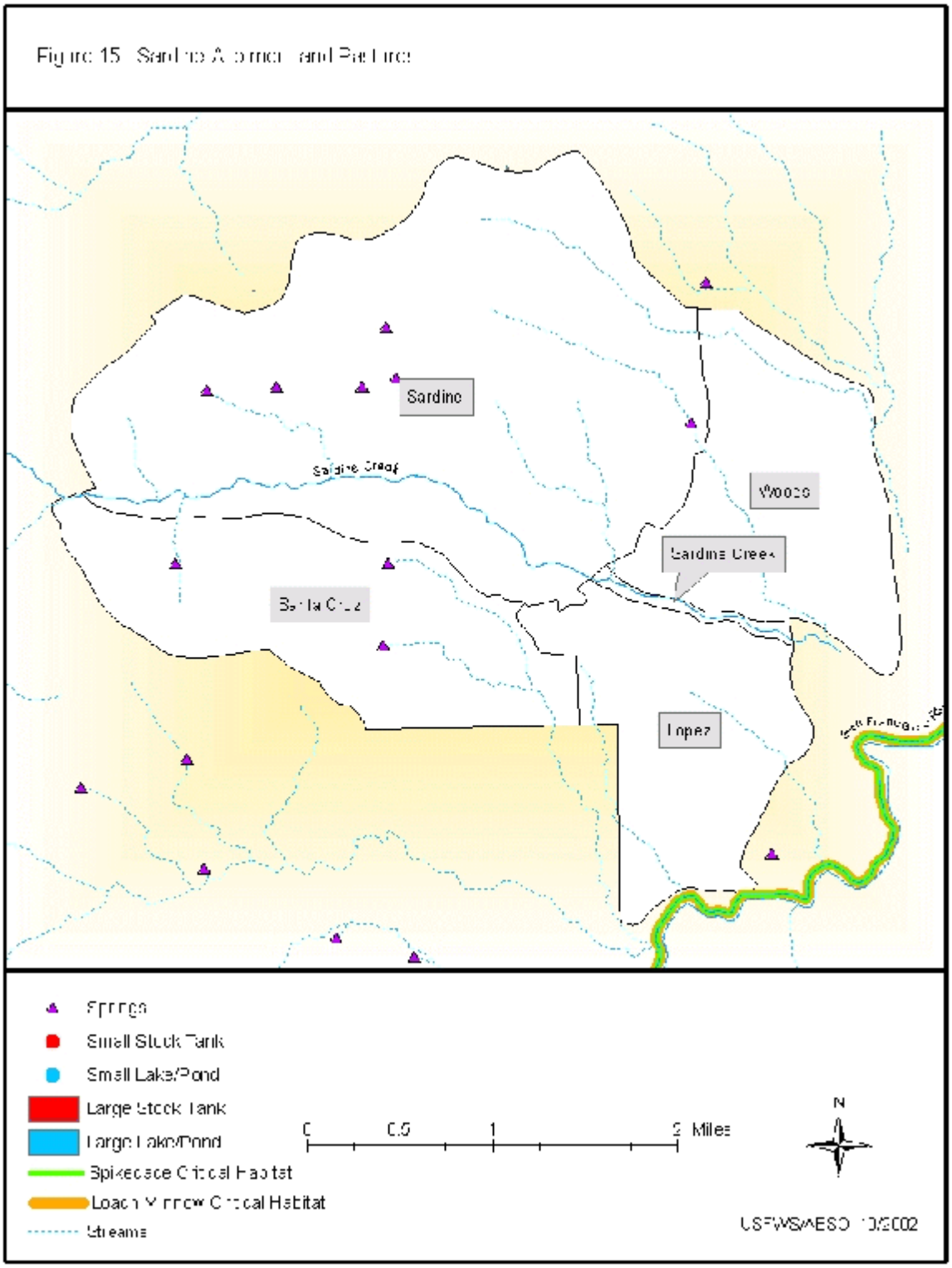


Figure 14. Wadsworth Allotment and Pastures
Mud Springs
Joe Lentz
North
Rear Cow
Wearing
Sand Rock
Little
No Grazing
Horse
South
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Spikedace Critical Habitat
Loach Minnow Critical Habitat
Streams
0 1 2 4 Miles
N


Sardine
Sardine Creek
Woods
Lopez
Springs
Small Stock Tank
Small Lake/Pond
Large Stock Tank
Large Lake/Pond
Spikedace Critical Habitat
Streams
0
0.5
1
2 Miles
N

APPENDIX C - Tables

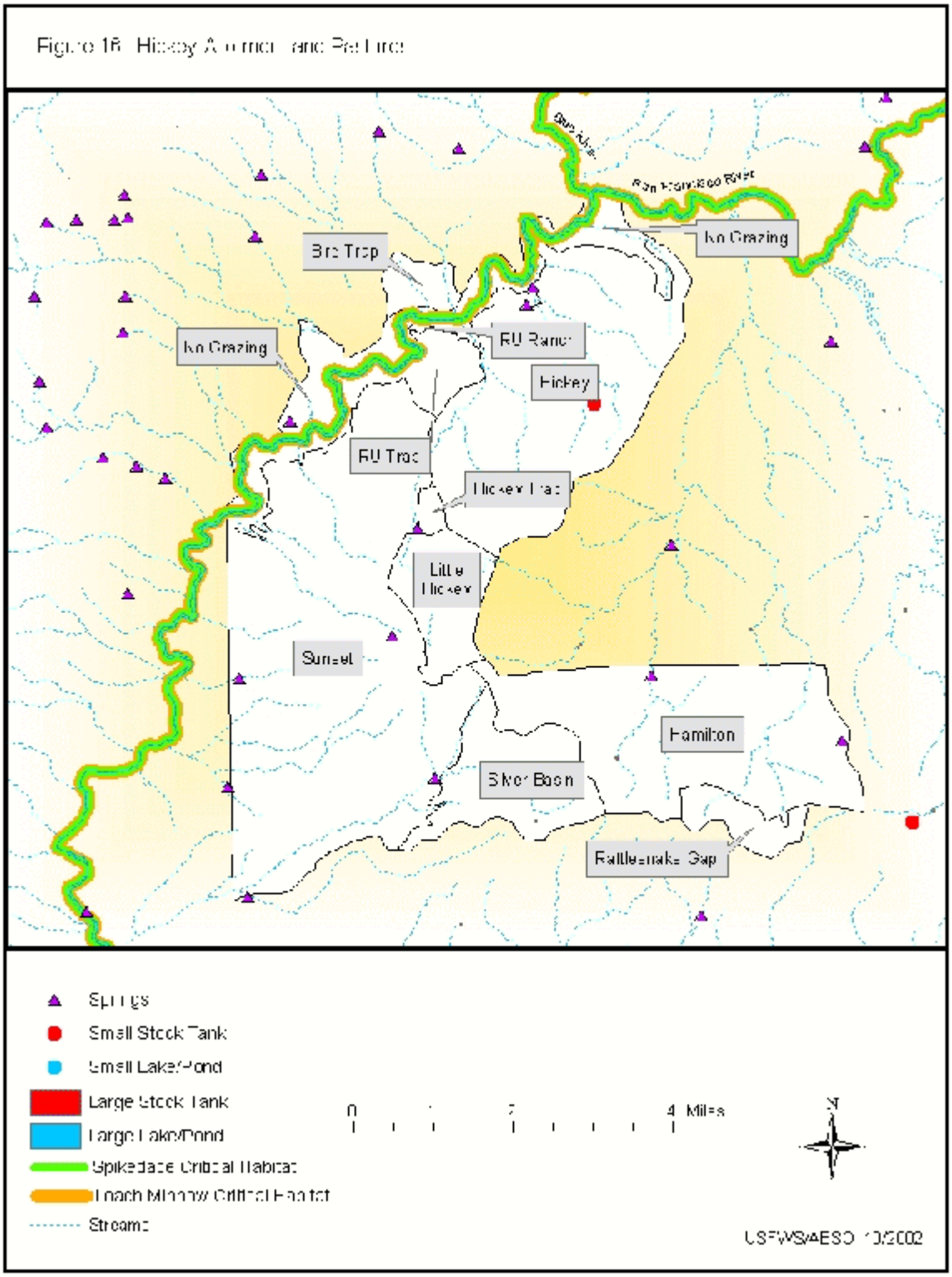


Table 2. Number of management territories (MTs) as reported by the Forest Service (U.S. Forest Service, *in litt*., January 22, 1996), percent of MTs as a proportion of the MTs in Forest Service Region 3, and the percent of suitable habitat surveyed in each Forest by National Forest (Fletcher and Hollis 1994).

National Forest	Number of MTs	Percent of MTs	Percent Suitable Habitat Surveyed
Apache-Sitgreaves	122	14.0	99
Carson	3	0.3	62
Cibola	43	5.0	41
Coconino	155	17.8	87
Coronado	108	12.4	49
Gila	197	22.7	50
Kaibab	6	0.7	96
Lincoln	126	14.5	90
Prescott	10	1.2	42
Santa Fe	33	3.8	44
Tonto	66	7.6	55
TOTAL	869	100.0	

Table 4. Section 7 consultations completed on the Apache-Sitgreaves National Forest for spikedace and loach minnow.

❍ **PLANNING**

2-21-83-F-16 reconsulted as 2-21-97-F-416	CR	Apache-Sitgreaves National Forests Plan	planning	Blue Black Eagle San Francisco	spikedace loach minnow Apache trout Little Colorado spinedace peregrine falcon bald eagle	05-06-86 superceded by new consultation on 12-19-97	ongoing	USFS	RO

2-000098RO 2-21-97-F-416	NJ	11 Forest Plans	planning	Gila Salt Black White San Francisco Blue Eagle Bonita Tonto Verde Agua Fria San Pedro Aravaipa Santa Cruz Little Col.	spikedace loach minnow razorback sucker desert pupfish Gila topminnow Little Colorado spinedace Apache trout Chihuahua chub Gila trout Sonora chub Yaqui catfish Yaqui chub 13 plants 2 herps 3 birds 3 mammals	12-19-97	ongoing	USFS	RO
❍ **ROAD AND BRIDGES**									

2-21-88-I-156	BC	San Francisco River ORV closure above Martinez Ranch	road	San Francisco	loach minnow	09-16-88	ongoing	USFS	A/S NF Clifton RD

2-21-94-F-243	INLAA NJ NJ NJ 	Blue River road, FR 281, repair and maintenance Blue River road best management practices, normal repair and maintenance Reroute of FR 281 near Bush Creek Blue Box lowwater crossing	road	Blue	loach minnow loach minnow razorback sucker bald eagle peregrine falcon SW willow flycatcher loach minnow (NJ) razorback sucker (NJ) bald eagle (INLAA) MX spotted owl (INLAA) SW willow flycatcher (INLAA) loach minnow	02-23-96 06-16-97 amended 09-11-97 06-25-98 10-14-97 12-02-98 	ongoing completed completed completed 	USFS	A/S NF Alpine RD

2-21-95-I-165	E	Eagle Creek, FR 217 flood repair	road	Eagle	spikedace loach minnow razorback sucker	1-27-95 2-14-95 3-10-95 no final BO	completed	COE USFS	Regulatory Branch, Phx; A/S NF Clifton RD
2-21-95-F-166	E-NJ E-no BO	Blue River road flood repair - Juan Miller crossing	road	Blue	loach minnow loach minnow razorback sucker	04-21-95 10-04-99	completed completed	USFS	A/S NF Clifton RD
2-21-96-I-060	INLAA	Highway 191 repair on Campbell Blue Creek	road	Blue	loach minnow peregrine falcon MX spotted owl	08-27-96	completed	USFS COE	A/S NF Alpine RD Regulatory Branch, Phx

2-21-96-F-233	NJ	San Francisco River road repair	road	San Francisco	loach minnow peregrine falcon	04-15-97	partially completed	USFS BLM	A/S NF Clifton RD Safford Dist.
2-21-97-I-062	INLAA	Tutt Creek trailhead access road	road	Blue	loach minnow razorback sucker jaguar MX spotted owl peregrine falcon	05-02-97	??	USFS	A/S NF Alpine RD
❍ **GRAZING**									
2-21-95-F-020	NJ	Baseline/Horse Springs Allotment Management Plan	grazing	Eagle	spikedace loach minnow razorback sucker bald eagle	07-20-95 amended 01-15-98	ongoing	USFS	A/S NF Clifton RD

2-21-95-I-441 part of 000089RO	INLAA INLAA	Bobcat/Johnson and Beaver Creek grazing allotment permits	grazing	Blue Black	loach minnow razorback sucker SW willow flycatcher MX spotted owl peregrine falcon Apache trout (10-27-95)	12-12-95[3] (date of the FONSI) 04-30-98[3]	ongoing	USFS	Apache-Sitgreaves NF
2-21-95-I-442 part of 000089RO	INLAA	Fishook-Steeple Mesa, Hannagan, and Fish Creek grazing allotments permits	grazing	Blue	loach minnow razorback sucker SW willow flycatcher MX spotted owl peregrine falcon Apache trout (10-27-95)	12-12-95[3] (date of FONSI) 4-30-98[3]	ongoing	USFS	Apache-Sitgreaves NF

2-21-95-I-443	INLAA	KP and Raspberry grazing allotment permits	grazing	Blue	loach minnow razorback sucker SW willow flycatcher MX spotted owl peregrine falcon Apache trout (10-27-95)	12-12-95[3] (date of FONSI)	ongoing	USFS	Apache-Sitgreaves NF
2-21-95-I-445	INLAA	Alpine grazing allotment permit	grazing	San Francisco	loach minnow SW willow flycatcher peregrine falcon Apache trout (10-27-95)	12-12-95[3] (date of FONSI)	ongoing	USFS	Apache-Sitgreaves NF
2-21-95-I-446 part of 000089RO	INLAA INLAA	Upper Campbell Blue grazing allotment permit	grazing	Blue	loach minnow SW willow flycatcher MX spotted owl peregrine falcon Apache trout (10-27-95)	12-12-95[3] (date of FONSI) 04-30-98[3]	ongoing	USFS	Apache-Sitgreaves NF

2-21-95-I-447	INLAA	Coyote-Whitmer and Turkey Creek grazing allotment permits	grazing	Blue San Francisco	loach minnow SW willow flycatcher MX spotted owl peregrine falcon bald eagle Apache trout (10-27-95)	12-12-95[3] (date of FONSI)	ongoing	USFS	Apache-Sitgreaves NF

000089RO	NJ	Ongoing livestock grazing on 21 allotments Bear Valley Boneyard Buck Springs Bush Creek Chrysotile Colter Creek Cow Flat Dark Canyon Double Circles East Eagle Foote Creek Hickey Hicks/Pikes Peak Limestone Montana Mud Springs Nutrioso Pigeon	grazing	Gila Eagle San Francisco Blue Black Salt Tonto Verde Little Col. Altar	spikedace loach minnow Gila topminnow Little Colorado spinedace Sonora chub razorback sucker peregrine falcon MX spotted owl lesser long-nosed bat AZ hedgehog cactus	02-02-99	ongoing	USFS	RO

000089RO continued	INLAA (for spikedace & loach minnow only)	13 Mile Rock Alexander Alma Alma waterlane Antelope Hills Apache Canyon Basin Beaver Creek Bee Springs Big Dry Black Bob Bobcat-Johnson Brown Springs Buckhorn Canyon Creek Cedar Breaks China Dam Chrysotile Citizen Colter Creek Copper Canyon	grazing	Gila Eagle San Francisco Blue Black Salt Tonto Verde Little Col. Altar	spikedace loach minnow (many other species also were INLAA for these and other allotments)	04-30-98[3]	ongoing	USFS	RO

		Double Circles Dry Creek Eagle Peak East Eagle Fishhook Foote Creek Fossil Creek Frisco Plaza Gila River Govina Hackberry/Pivot Rock Harden Cienga Harve Gulch Haystack Butte Hickey Hicks-Pikes Peak Jerome Jordan Mesa Kelly Leggett							

		Red Hill Roberts Park Rudd Knoll Sardine Sedona Sedow Silverdale Squaw Peak Steeple-Mesa Stone Creek Strayhorse Taylor Tule Springs Upper Campbell Blue West Bear/Del Rio XSX Yeguas Young							

2-22-99-F-016	NJ INLAA (for spikedace and loach minnow only)	Term permits for livestock grazing on 7 allotments A Bar Draw Dark Canyon Dragoon Gila River Granville Paradise Radium 13 Mile Rock Antelope Hills Black Mountain Canyon del Buey Centerfire China Dam Dilman Creek East Apache Creek Lower Campbell Blue	grazing	Eagle Blue San Fran. Santa Cruz Wilcox San Simon Salt San Carlos Gila	spikedace loach minnow lesser long-nosed bat spikedace loach minnow (many other species also were INLAA for these and other allotments)	06-30-99 04-20-00[3]	ongoing	USFS	New Mexico Field Office

2-22-99-F-016	INLAA Loach Minnow	Cow Flat Foote Creek Red Hill Stone Creek Dark Canyon Granville Hell's Hole Strayhorse Lake Mountain Complex Basin Colter Creek Murray Basin Picnic Voigt Irishman Dam Juan Tank Partridge Creek West Bear	Grazing	Eagle Blue San Fran. Santa Cruz Wilcox San Simon Salt San Carlos Gila		06-30-99 (BO) 10/1/98 (BA with determinations, Appendix C)		USFS	New Mexico Field Office

as part of 000089RO as part of 2-22-99-F-416 2-21-00-F-286 2-21-00-F-286	LAA LAA NJ Amend.	Black River, Boneyard, Nutrioso Summer, and Williams Valley grazing allotments	grazing	Black	loach minnow bald eagle (INLAA) peregrine falcon(INLAA) jaguar (INLAA) L. Col.spinedace(INLAA) MX gray wolf (NJ) SW willow flycatcher (INLAA) MS spotted owl (INLAA) ditto loach minnow L. Col.spinedace(INLAA)	04-30-98[3] 04-20-00[3] 02-26-01 11-01-01	ongoing	USFS	RO Apache-Sitgreaves NF

2-21-95-F-020R 2-21-01-F-308 2-21-01-F-105 2-21-01-F-309 2-21-01-F-310 See Also: 0000890RO	LAA	Ongoing grazing for Apache Sitgreaves for East Eagle Mud Springs Baseline/Horsesprings Double Circle Tule Dark Canyon	grazing	Eagle	spikedace ch loach minnow ch	12-26-01 Draft		USFS	Apache-Sitgreaves NF Clifton RD

2-21-01-F-305 2-21-90-F-120 2-21-01-F-313	LAA	P.S. Allotment Hayground Allotment Udall Allotment	grazing	Black	spikedace ch	11-29-01 (Draft)	ongoing	USFS	Apache-Sitgreaves NF Alpine RD Springervill e RD
2-21-01-F-189	LAA	Pleasant Valley Allotment	grazing	Eagle	spikedace ch loach minnow ch	11-30-01	ongoing	USFS	Apache-Sitgreaves NF Clifton RD
FOREST SERVICE - TIMBER									
2-21-91-F-054	NJ	Campbell and Isabelle timber sales	timber	Blue	loach minnow Apache trout	05-07-93	partially dropped	USFS	A/S NF Alpine RD

2-21-94-I-419	INLAA INLAA	Tenney timber sale improvement project Tenney fuelbreak maintenance project	timber	Blue Black	loach minnow Apache trout MX spotted owl bald eagle SW willow flycatcher	08-02-94 04-05-95	completed ?	USFS	A/S NF Alpine RD
2-21-97-I-066	INLAA	Little timber sale	timber	San Francisco	loach minnow peregrine falcon jaguar brown pelican bald eagle MX spotted owl	2-19-97 2-21-97	??	USFS	A/S NF Springervill e RD
FIRE									
2-21-96-I-391	INLAA	East Castle prescribed burn	fire	Blue	loach minnow peregrine falcon MX spotted owl MX wolf bald eagle	02-19-97	??	USFS	A/S NF Alpine RD

2-21-97-I-060	INLAA	McKibben prescribed burn	fire	Blue	loach minnow Apache trout MX wolf peregrine falcon bald eagle	02-19-97	??	USFS	A/S NF Alpine RD
2-21-97-I-077	INLAA	East Eagle addition prescribed burn	fire	Eagle	loach minnow peregrine falcon MX spotted owl bald eagle jaguar MX wolf	05-02-97	??	USFS	A/S NF Clifton RD
2-21-99-F-317	NJ	Robinson Mesa prescribed burn	fire	Eagle	spikedace (INLAA) loach minnow (NJ) razorback sucker(NLAA) MX gray wolf jaguar (INLAA) bald eagle (INLAA) MX spotted owl	10-8-99	??	USFS	Apache-Sitgreaves NF Clifton RD
FLOODING (FLOOD REPAIR AND CONTROL)									

2-21-00-F-298	NJ	Honeymoon Campground bank stabilization project	flooding	Eagle	spikedace loach minnow razorback sucker MX spotted owl	10-31-00	??	USFS	Apache-Sitgreaves NF Clifton RD
RECREATION									
2-21-97-I-061	INLAA	KP trail reconstruction	recreation	Blue	loach minnow Apache trout razorback sucker	02-19-97 02-21-97	??	USFS	A/S NF Alpine RD
STOCKING (OF ANIMALS)									
MISCELLANEOUS									
2-21-97-F-136	NJ	Navopache Power powerline repair	powerline	Blue	loach minnow razorback sucker bald eagle	03-24-97	completed	USFS	A/S NF Alpine RD

Table 6. Summary of Watershed Conditions on 5th Code Watersheds Within Allotment Boundaries.

Allotment/Watershed	Satisfactory (Acres)	Unsatisfactory (Acres)
Cow Flat/Middle Blue River	6,746	7,733
Red Hill/Middle Blue River	419	749
Wildbunch/Lower Blue River	11,514	4,275
Wildbunch/Lower San Francisco River	2,122	5,159
Sardine/Lower San Francisco River	1	5,484
Sardine/Lower Blue River	0	14
Hickey/Lower San Francisco River	793	13,629
Hickey/Lower Blue River	2.5	0.5
Hickey/Middle Gila River	0	50
TOTALS	21,597.5	37,093.5
Percentages	37	63

Table 7. Soil Condition Within the Various Allotments in the Blue and San Francisco watersheds.

Allotment Name	% Stable or Satisfactory	% Impaired or Unsatisfactory	% Unstable or Unsuited
Stone Creek	78	22	0
Upper Campbell Blue	94	6	0
Turkey Creek	27	23	50
Bobcat-Johnson	28	4	68
Foote Creek	70	29	1
Red Hill	10	90	0
Fishhook-Steeple Mesa	19	25	56
KP	56	20	24
Cow Flat	32	68	0
Raspberry	3	3	94
Pigeon	13	25	62
Wildbunch	24	12	64
Sardine	0.2	99.8	0
Hickey	12	88	0
TOTALS	466.2	514.8	419
Percentages	33	37	30

Table 8. Summary of Range Conditions by Allotment.					
	Excellent	Good	Fair	Poor	Very Poor
Stone Creek	0	83	2,339	6,476	3,339
Upper Campbell Blue	766	8,815	5,749	3,832	0
Foote Creek	0	263	692	4,248	9,316
Red Hill	0	0	316	1,364	5,967
Cow Flat	0	0	5,847	7,841	9,047
Pigeon	0	0	6,257	3,103	2,720
Wildbunch	0	607	5,917	854	237
Sardine	0	0	382	999	0
Hickey	0	158	11,329	2,094	0
Totals	766	9,926	38,828	30,811	30,626
Percent	<1%	9	35	28	28

No information was provided for the Turkey Creek, Bobcat-Johnson, Fishhook-Steeple Mesa, Bush Creek, KP, Raspberry, or Sardine allotments.

Table 9a. Riparian Condition for Allotments on the Springerville Ranger District.

Allotment	Satisfactory Miles	Unsatisfactory Miles
Upper Campbell Blue	1	9
Turkey Creek	1.25	23.75
Bobcat-Johnson	20.4	39.6
Fishhook-Steeple Mesa	25.2	37.8
TOTAL	47.85	110.15
Percent	30%	70%

Table 9b. Riparian Conditions for Allotments on the Clifton Ranger District.

Allotment	Proper Functioning Condition	Functioning at Risk (Upward Trend)	Non-Functional
Wildbunch	.325	8.625	.875
Hickey		6.500	6.000
TOTAL	.325	15.125	6.875
Percentage	1	68	31